TECHNOLOGY DEPT.

Gas Journal

LIGHT - HEAT - POWER - BY-PRODUCTS

Vol. 246. 97th Year. LONDON, SEPTEMBER 26, 1945. Registered as a Newspaper. No. 4297. Price 1/-

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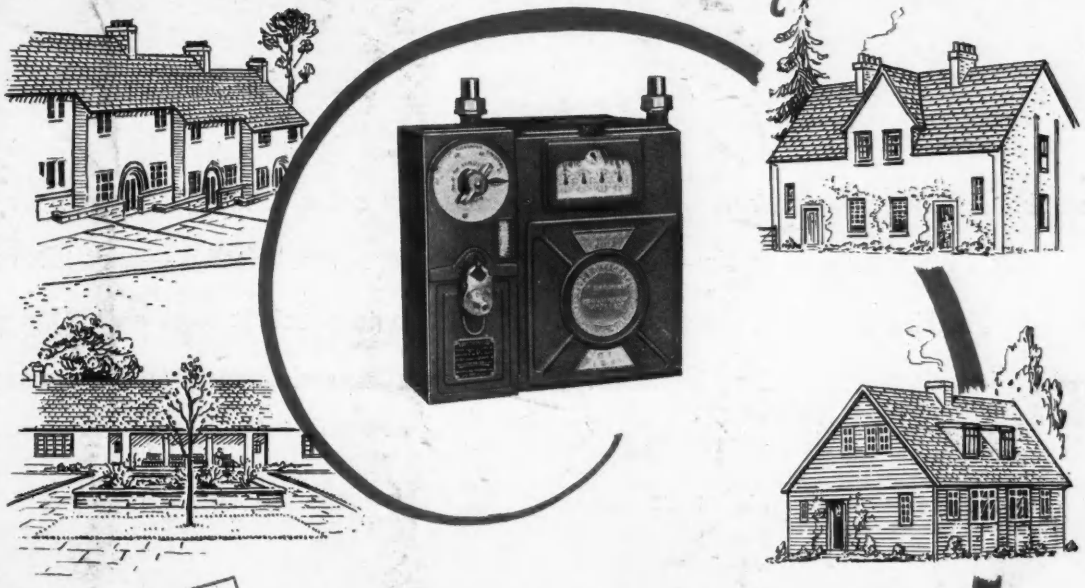

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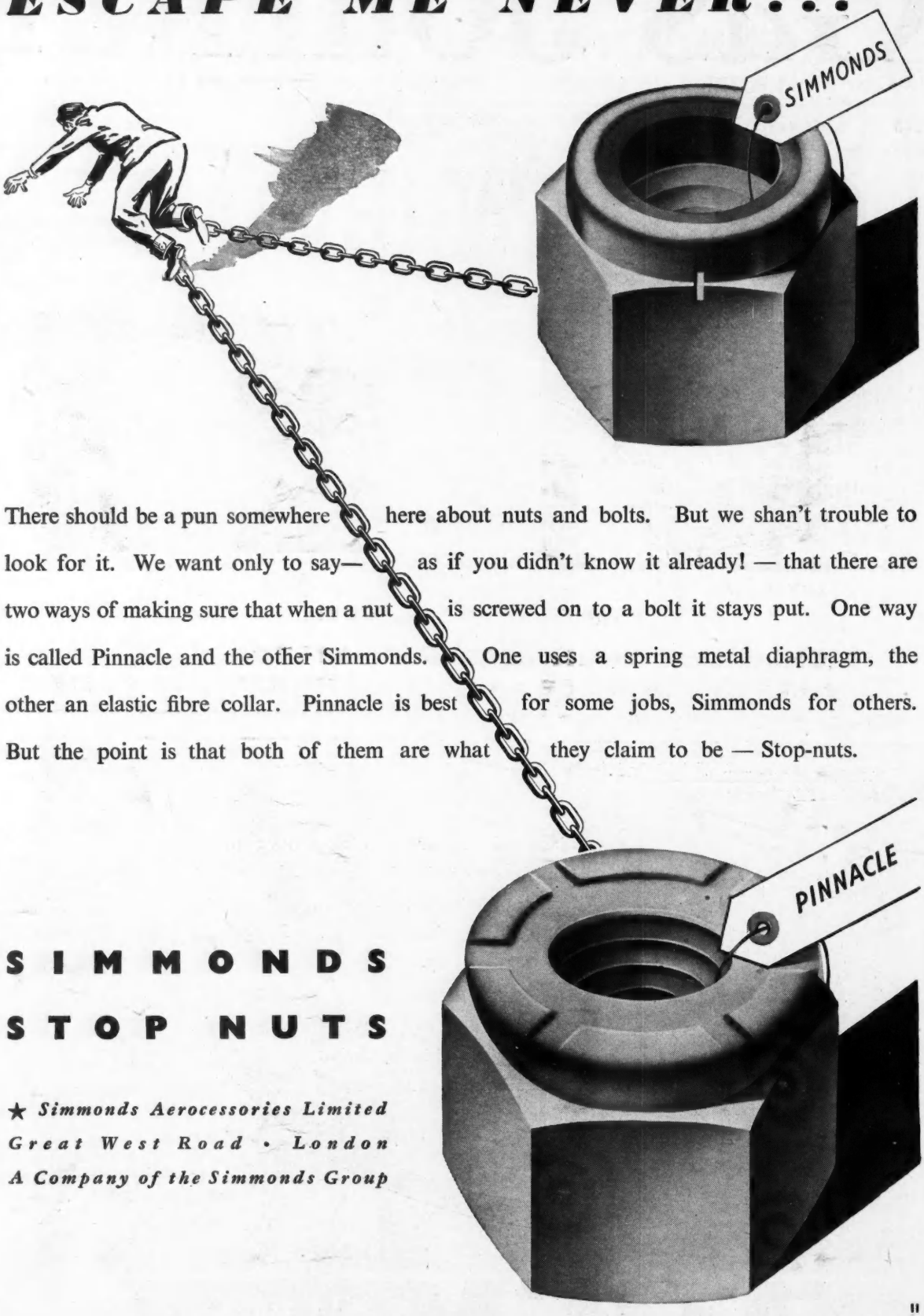

There should be a pun somewhere here about nuts and bolts. But we shan't trouble to look for it. We want only to say— as if you didn't know it already! — that there are two ways of making sure that when a nut is screwed on to a bolt it stays put. One way is called Pinnacle and the other Simmonds. One uses a spring metal diaphragm, the other an elastic fibre collar. Pinnacle is best for some jobs, Simmonds for others. But the point is that both of them are what they claim to be — Stop-nuts.

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GAS JOURNAL, SEPT. 26, 1945

VOL. 246 97th YEAR No. 4297

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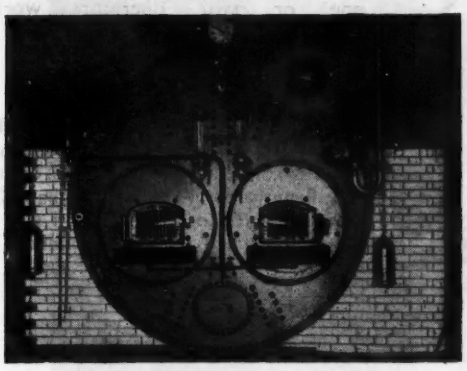

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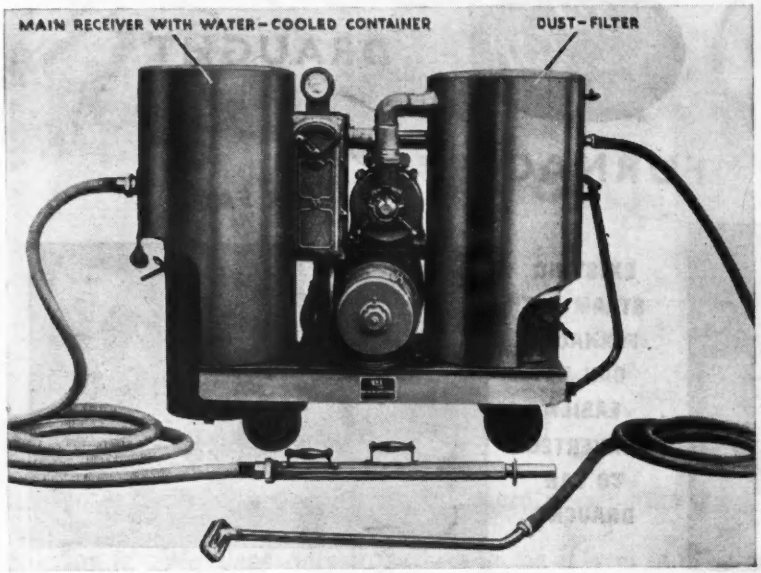

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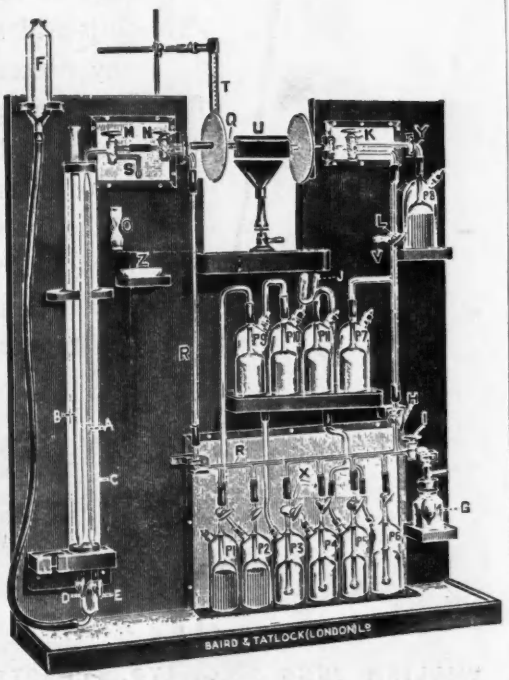

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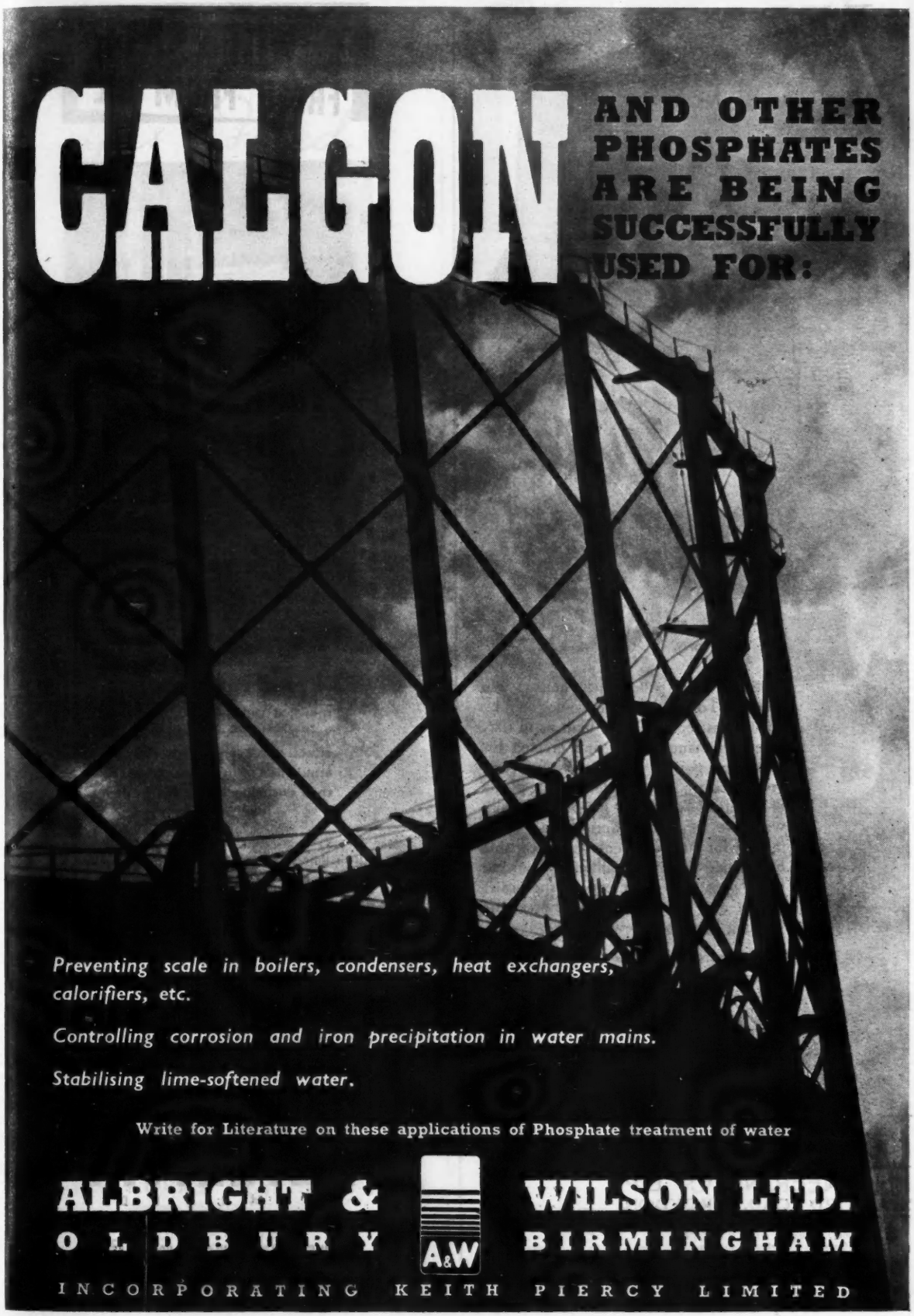
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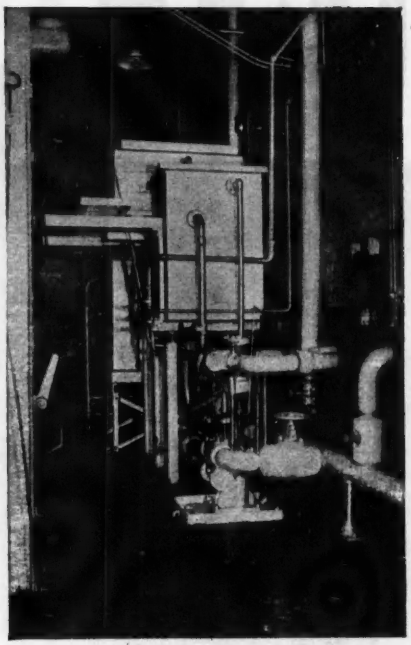

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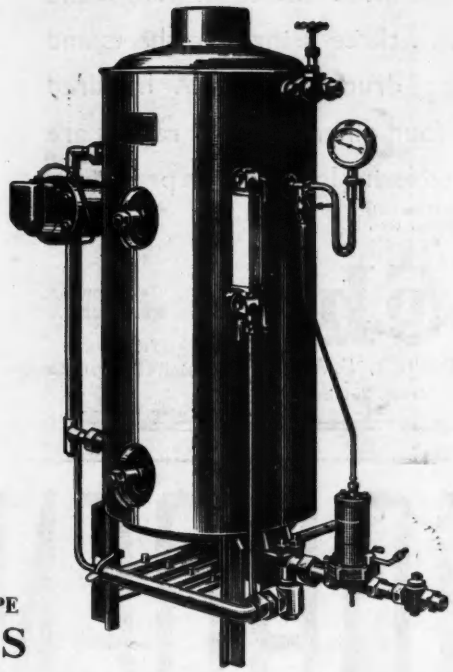

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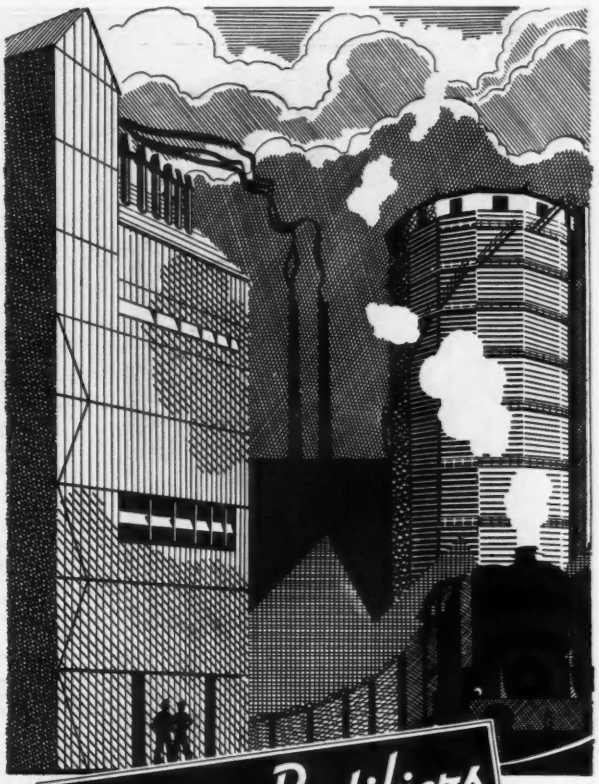

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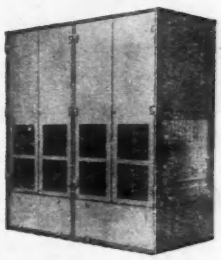

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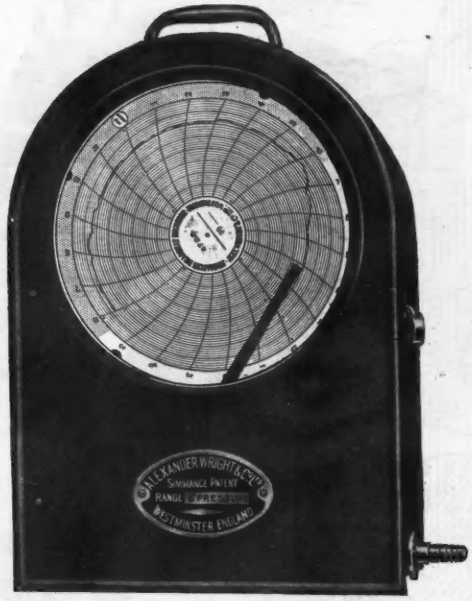

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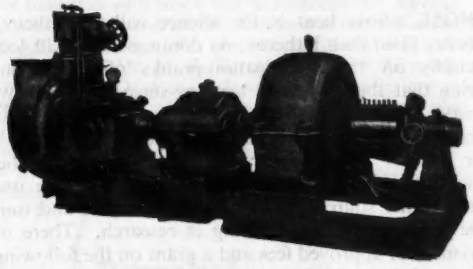

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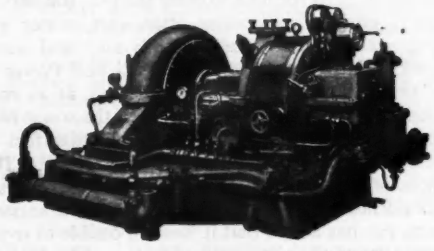

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GAS JOURNAL, SEPT. 26, 1945

VOL. 246 97th YEAR No. 4297

EDITORIAL NOTES

LABOUR SHORTAGE

IN the coal industry at the moment the loss of man-power is exceeding the intake. From 717,000 last February the industry's labour force has fallen to 710,000. The industry's normal annual loss of manpower is about 30,000—*i.e.*, gross annual loss. Since VE Day it has been at the rate of 40,000 a year. The Labour Correspondent of *The Times* says that releases from the services will stem the tide, but will probably do no more than that over the winter as a whole; in the immediate future there will be continuing loss. Every former underground miner not due for early release is to have the opportunity for release in Class B whetever his age group if he is willing to return to coal mining. Since 1943 about 10,750 volunteers from other occupations have been placed in coal mining, and 7,000 men who volunteered for training were released from the forces. During the last three years 17,000 men liable for military service have exercised the option to go in the mines, and the number of the Bevin boys has been 21,000. Altogether these special recruiting measures added 100,000 to the labour force of the industry. The short-term policy for the industry is to bring back from the forces every experienced miner; the medium term policy must, says the correspondent of *The Times*, be to stimulate recruitment through the attractiveness of the industry's wages and conditions; and the long-term policy will be linked with reorganization and mechanization and the development of a machine-minded labour force.

In recent issues of the "JOURNAL" we have called attention to the fact that there is a serious insufficiency of labour in the Gas Industry. The Industry requires at once 2,830 stokers and labourers, and 1,750 workers of other descriptions. In addition, 1,500 are wanted for work connected with street lighting. To help the Industry through its difficulties the Admiralty and the Air Ministry have released 2,000 men, there has been recruiting in Eire, prisoners of war have been employed where possible, and a "nominated workers' " scheme for gasfitters is in force. The first 25 age groups of service releases will only yield 2,200 gasfitters and 3,000 stokers and labourers with reinstatement rights in the Industry, and all these men will not be immediately available. Further B class releases are contemplated, and meanwhile, under the class B block releases, there are to be about 1,000 fitters available for the gas and electricity industries.

The Ministry of Labour and National Service is giving much publicity to the urgent need for men to enter the Gas Industry—stokers, gasfitters, purifier and boiler attendants, water gas plant operators, maintenance fitters, mainlayers, and lamp attendants. Concurrently the Ministry of Fuel and Power is emphasizing in the Press that, while our battles are at an end, the stark fact remains that they have left us with the worst coal scarcity on record, and that every effort to economize fuel in industry and the home must be intensified this winter. The production officer of the National Union of Mineworkers has expressed his confidence that the men will respond to the appeals for further efforts, but has added that it was impossible to over-emphasize the gravity of the situation; and miners' leaders do not expect that more than about 10,000 men now in the forces will return to the industry either under Class A or Class B releases; even this is considered an optimistic estimate. On the same day—last Saturday—the Minister of Fuel and Power expressed his conviction that coal supplies would be increased, and spoke of a "better atmosphere than we have ever seen before," and of a greater spirit of co-operation existing between management and men.

THE DEGREE-DAY

SINCE its introduction by the American Gas Association some years ago, the degree-day, as pointed out by the Author of an article which we published in our columns last week, has been a valuable yardstick to the entire heating industry and is potentially of far greater usefulness. Because of the general need for national standardization of the conception, the National District Heating Association invited the various groups and industry associations allied with the heating industry to join in the formation of a committee to make a detailed study of the problem. Joining in rapid succession were the American Gas Association, the United States Weather Bureau, the American Society of Heating and Ventilating Engineers, the National Warm Air Heating Association, the Oil Institute of America, the National Coal Association, and, of course, the National District Heating Association. As a result of its deliberations the committee decided that the present base temperature for degree-day computation of 65°F. is entirely satisfactory for normal occupancy—current degree-days for any day, for use where there is normal occupancy, to be computed by subtracting the daily mean temperature from 65°F. It was decided, too, that the normal degree-days for any day of the year for any location shall be computed, first, by adding the current daily degree-days for that day for a 20-year period and dividing by 20, and secondly, by adjusting as required to produce a smooth curve of the normal degree-days for the month in which the day occurs, while maintaining the same monthly total degree-days both before and after adjusting. When the committee's decisions and recommendations have been fully approved by the organizations of the heating industry and others interested, the U.S. Weather Bureau plans to incorporate degree-day information in its regular monthly weather summaries, to publish a new degree-day instruction book, and to prepare an iso-degree-day map of the United States.

SCIENCE IN FUNDS

THOSE whose bent is for science will have their pockets better filled than hitherto; no doubt parents will look more kindly on the investigation-pranks of their youngsters, realizing that their scientific teething-stage may meet with due reward. A new scheme has been designed by the Department of Scientific and Industrial Research to meet the needs for a larger number of trained investigators. There will be maintenance allowances for qualified students who are unable to get from other sources the cost of maintenance and training to enable them to undergo training in research. There will also be payment of approved fees and a grant on the following scale: Oxford and Cambridge students living at home, £180; students in lodgings or at a college or hostel, £260; London, £180, £250; other universities, £180, £220. It is considered desirable that students should undertake some teaching work. Senior research awards tenable at any institution in Britain approved by the advisory council will not normally exceed £400 a year plus approved fees for two years, but the period may be extended to three years. Applications will be considered from investigators of acknowledged standing for researches of exceptional timeliness and promise in which they are personally engaged. Grants may be made to enable investigators to employ a scientific, laboratory, or clerical assistant, and to purchase special equipment or material or for any other approved purpose.

Truly, times have changed; we live in an era in which science holds considerable sway. The Gas Industry will doubtless perceive a moral in all this.

Improvement of salaries and careers of those engaged in scientific civil service has been announced. The Government has decided that the salaries of the heads of major departments shall be £3,500 a year and the salaries of their deputies £2,500 (Cmd. 6680, H.M. Stationery Office). Another White Paper (Cmd. 6679) announces a complete reorganization of the scientific civil service. The scheme includes the creation of a scientific officer class recruited from highly qualified scientific graduates on salaries aligned, at certain points, to those of the administrative class. At the highest levels there will be salaries of £2,250 and £2,500, with two or three posts at £3,000. There will also be an experimental officer class, which is to replace the present scientific assistant class. This class is to be recruited partly from boys and girls aged 18–19 who have specialized in scientific subjects, and partly from university graduates, and from persons with experience in industry and engineering. Salaries will range from £150 on recruitment at age 18 to £800. All these figures are subject to bonus addition. An interdepartmental scientific panel is to be set up, under the chairmanship of Sir Edward Appleton, to keep under review the well-being and efficiency of the Government Scientific Service, and in particular to stimulate contacts between science in the Civil Service and science outside. The Government is resolved that the conditions of service for scientists working for the Government shall be such as to attract scientifically qualified men and women of high calibre. These are better conditions of service for scientists, and in particular conditions under which their own experimental research will be both facilitated and stimulated, improvement of their status and remuneration, and centralized recruitment. Study of the two documents we have mentioned may provide the Gas Industry with incentive to offer better salaries to the scientific workers and technicians, without whom the Industry cannot hope to progress.

North-Western Fuel Luncheon Club

Many distinguished guests are expected to attend the inaugural luncheon meeting at the Engineers' Club, Manchester, on Oct. 3, of the North-Western Fuel Luncheon Club, whose formation on generally similar lines to those of the Fuel Luncheon Club in London was announced in the "JOURNAL" of Aug. 1. Instead of the usual formal Presidential Address there will be the innovation of three speakers—Sir Frederick West (President), Mr. M. K. Burrows (Vice-President), and Mr. G. Macdonald—giving short addresses on the objects of the Club, and the ways in which it can serve and foster the interests of its members and the industries with which they are associated. Already the membership exceeds 150, and all branches of the fuel industries are represented, coal, coke, electricity, gas, oil, petroleum, research, chemistry, and utilization. Mr. M. K. Burrows, Dr. E. S. Grumell, Mr. R. A. S. Thwaites, and Dr. F. Kind have accepted invitations to become Vice-Presidents; Mr. T. A. Tomlinson has undertaken the duties of Hon. Treasurer, and Mr. C. Gandy, Chairman of the National Smoke Abatement Society, is the Hon. Legal Adviser. As already reported, Mr. R. Baker, of Selas Works, City Road, Manchester, 15, is the Hon. Organizing Secretary. A second luncheon meeting has been arranged for Nov. 7.

Personal

A well-known, well-liked personality, Mr. J. E. LISTER COOPER Engineer, Secretary, and Manager of the Yeadon and Guiseley Gas Company, and a member of the Board of Directors, is to retire from that post on Sept. 30, after 47 years with the Undertaking. He took over managerial control in 1914 in succession to his uncle, Mr. Edward Lister, who had been Manager and Engineer for 50 years, and he was elected to the Board in 1936. Mr. Cooper is also a Director of the Pudsey, Otley, and Elland Gas Companies. An active member of the Manchester District Association of Gas Engineers, he is also a member of the Executive of the National Gas Council, the Executive of the Federation of Gas Employers, a member of the Yorkshire (West Riding) Joint Industrial Council, Deputy-Chairman of the Yorkshire Commercial Section, and a member of the Yorkshire Joint Tar Board. In earlier years he was President of the Yorkshire Junior Gas Association, in which he has always retained a close interest. During Mr. Cooper's period in control of the Yeadon Undertaking the gas output has increased by 250%, and capital expenditure per million cubic feet of gas sold has been reduced from £702 to £413. Closely identified with many public affairs in Yeadon, Mr. Lister Cooper is a past-chairman and still a member of the Aireborough Urban District Council, the combined local authority for Yeadon, Guiseley, and Rawdon.

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Mr. J. MCNAIR, Engineer and Manager of the Richmond (Yorks) Gas Department for the past five years, has been appointed Engineer and Manager of the Skipton Gas Department.

* * *

Mr. F. A. BUTT, Chief Chemist and Technical Assistant to the Cheltenham and District Gas Company, has been appointed Chief Works Superintendent of the Lincoln Gas Department.

* * *

Sir GEORGE PAGET THOMSON, F.R.S., has accepted the Presidency of the Junior Institution of Engineers (Incorporated) for the 1945–46 session. He will be inducted by the retiring President, Major-General K. C. Appleyard, at a meeting in the Institution Lecture Room on Dec. 8, at 2.30 p.m. His Presidential Address will be on "Atomic Energy."

* * *

His many friends in the Gas Industry will be pleased to hear that Mr. C. HALES-FINCH, Southern Representative of John Wright & Co., Ltd., has now been reported as out of Japanese hands, after his captivity in Siam. He is in India and on his way home.

Diary

Sept. 29.—Western Junior Gas Association: Exeter Gaslight and Coke Company's Showrooms, Southernhay East, Exeter, 3 p.m. Paper by L. Friedman on "Water Heating."

Oct. 1.—Gas Research Board: Special Meeting of Council, Gas Industry House, 10 a.m.

Oct. 2.—Gas Research Board: Finance Committee, 11.15 a.m.; Membership Committee, 12 noon; Council, 2 p.m., Gas Industry House.

Oct. 2.—Midlands District Gas Salesmen's Circle: Annual Meeting, Chamber of Commerce, 95, New Street, Birmingham, 2 p.m. Address by C. H. Chester.

Oct. 3.—Institute of Fuel (London Section): Institution of Mechanical Engineers, Storey's Gate, 6 p.m. Paper on "The Effect of Output on the Thermal Efficiency of Heating Appliances," by M. W. Thring.

Oct. 5.—North of England Gas Managers' Association: Autumn meeting, 30, Grainger Street, Newcastle-on-Tyne, 2.30 p.m. Address by A. E. Sylvester, Chairman of the British Gas Council.

Oct. 6.—Yorkshire Junior Gas Association: Annual Meeting, Great Northern Hotel, Leeds. Address by C. S. Shapley.

Oct. 8.—Women's Gas Council, Finance and Emergency Committee, 12.45 p.m., Gas Industry House.

Oct. 9.—British Gas Council: Gas Industry House, 2.15 p.m.

Oct. 9.—Illuminating Engineering Society: Opening Sessional Meeting, School of Hygiene and Tropical Medicine, Keppel Street, W.C. 1. Presidential Address by H. C. Weston, 6 p.m.

Oct. 10.—Southern Association of Gas Engineers and Managers: Annual General Meeting, Grosvenor House, Park Lane, London, W. 1, 2.45 p.m. Presidential Address by W. A. Howie. Luncheon at 1 p.m. General Committee, 11.30 a.m.

Oct. 15.—London and Counties Coke Association: Finance Committee, 10.30 a.m.; Executive Committee, 11 a.m.; Central Committee, 12 noon; Annual Luncheon, 1 for 1.15 p.m.; Annual General Meeting, 2.45 p.m., Grosvenor House, Park Lane, W. 1.

Oct. 17.—Institute of Fuel: Royal Geographical Society. Melchett Lecture by Professor C. H. Lander, C.B.E., 6 p.m.

Oct. 25.—Town and Country Planning Association: Lunch-time meeting, 28, King Street, Covent Garden, W.C. 2. Talk and discussion on "Town Planning and District Heating."

Oct. 29.—Eastern Counties Gas Engineers' and Managers' Association: Autumn Meeting, Grosvenor House, Park Lane, W. 1.

Nov. 27–28.—Institution of Gas Engineers: Autumn Research Meeting.

Dec. 6.—Town and Country Planning Association: Lunch-time meeting, 28, King Street, Covent Garden, W.C. 2. Talk and discussion on "Heating the Family Home."

Owing to Food Restrictions the attendance at the annual luncheon of the Institute of Fuel on Oct. 17 at the Connaught Rooms will be limited to 600. No tickets are now available, the full number having been taken by members. Among the speakers at the luncheon, in addition to the President and the two Melchett Medallists, will be Mr. E. Shinwell, Minister of Fuel and Power, Mr. R. W. Foot, Chairman of the Mining Association of Great Britain, and Mr. A. Horner, National Coal Production Officer.

Wales and Monmouthshire Association

A General Meeting of the Wales and Monmouthshire Association of Gas Engineers and Managers was held at the Grand Pavilion, Porthcawl, on Sept. 13, under the Presidency of Mr. W. T. Kenshole (Merthyr Tydfil). It was the first meeting at Porthcawl since 1938, and a cordial welcome was extended to the members by Councillor E. Thomas, Chairman of the Gas Committee, on behalf of the Porthcawl Urban District Council.

The PRESIDENT welcomed Dr. W. T. K. Braunholtz, Secretary of the Institution of Gas Engineers, Mr. W. H. Johns, Mr. B. W. Blackledge, Chairman of the South Wales Section of the Coke Oven Managers' Association, Major E. Ivor David, Regional Gas Officer, and other guests.

The following new members and associates were unanimously elected: Members—Mr. C. Jones (Neath) and Mr. R. V. Hart (Maesteg); Associates—Mr. E. J. Perks and Mr. J. Rounds.

The PRESIDENT introduced the President-Elect, Mr. O. P. Cronshaw (Rhyl), and invited him to occupy the Presidential chair. This was, he said, a somewhat historical occasion as it was the first time they had had a President from the Northern area since the amalgamation of the North and South. During the period he had been among them and taken part in the deliberations of the Council Mr. Cronshaw had endeared himself to them not only by his personal charm, but also on account of the business acumen he had brought to bear upon the Council's work.

In taking the chair Mr. CRONSHAW paid tribute to the friendship which the members from the North had received from those in the South. His first duty as President was to thank Mr. Kenshole for his services during the past year. He had added dignity to the Association and had steered it into the calmer waters of peace, and he hoped that by his example they would make the best of their opportunities in the future.

Mr. W. CLARK JACKSON (Neath), seconding the vote of thanks, said Mr. Kenshole was a worthy son of a worthy father. He was associated with MR. Kenshole's father for the first three or four years after he came to South Wales, and succeeded in winning not only his approbation, but also his close friendship. He (Mr. Jackson) had the honour of giving Trevor Kenshole probably his first start when his father put him on the works with him, and he realized that in him he had a lad coming into the Industry who, by reason of his keenness and his ability to apply his brain to his training and his work, was bound to make his mark. In electing him as President the Association not only did him honour, but did itself a great service.

The PRESIDENT made a token presentation of a silver salver to Mr. Kenshole.

In response Mr. Kenshole thanked the Secretary, Mr. E. M. Edwards for his invaluable aid during his year of office. With the change of times brought about by the termination of the war there would inevitably be changes in the affairs of the Gas Industry. They were not permitted as yet to know what form those changes would take, but whatever the changes might be, the Association would be necessary in order to further the interests of the Industry which they served, and which would certainly have a great future under the consolidating arrangements which would undoubtedly take place.

The SECRETARY presented the 35th annual report of the Special Purposes Section, the membership of which now consists of 10 local authorities and 23 companies. In view of the fact that much of the work for which the Section was formed is now being dealt with by other bodies, the report suggested that it was desirable that a decision be made in the near future as to the advantages or otherwise of the continuance of the Section in its present form. During the year the Council had given consideration to the question of the insurance of the gas purging machine purchased by the co-operative effort of gas undertakings in the district. The Council had agreed that the Association should undertake the insurance of the machine for 12 months, the position then to be reconsidered.

The report was adopted, and the President said the Council would deal with the matters mentioned in it.

The PRESIDENT referred to the appointment of Mr. W. R. Branson, Assistant Engineer of the Cardiff Gas Light and Coke Company, to the Control Commission for Germany, and in the name of the Association he asked the Secretary to convey their best wishes to Mr. Branson, and their hope that he would be successful in bringing some measure of order to the job he was trying to do in Germany.

To fill the vacancy on the Council caused by Mr. Branson's departure the meeting unanimously elected Mr. W. Clark Jackson.

The arrangements for the next meeting were left in the hands of the Council.

Major E. IVOR DAVID, Regional Gas Officer, read a Paper on "South Wales Gas Coals." The Paper and the discussion will be dealt with in the "JOURNAL" later.

A large number of members and visitors afterwards attended the luncheon at the Casino Ballroom, at which the toast of "The Town and Prosperity of Porthcawl" was proposed by Mr. J. H. Canning, O.B.E., J.P., and responded to by Councillor E. Thomas, Chairman of the Porthcawl Gas Committee.

Dr. W. T. K. BRAUNHOLTZ proposed the toast of the Association and apologized for the absence of Col. C. M. Croft, President of the Institution of Gas Engineers. On behalf of the Institution he acknowledged the generous gesture of the Association in offering some months ago to go to the assistance of any undertaking whose works suffered from enemy attack if it were necessary to afford such an undertaking or its personnel any relief. Fortunately the need did not arise, but everybody, particularly in the South of England, appreciated the offer very much. He also referred to the way in which individually and collectively the members supported the Benevolent Fund. It was not long ago that the Association set aside out of its Octavius Thomas Memorial Fund a substantial sum for the Benevolent Fund, and at their last meeting a generous victory collection was also taken for the same purpose.

The PRESIDENT briefly responded to the toast.

In the afternoon the "Upjohn" Cup was played for on the links of the Royal Porthcawl Golf Club. The cup was won by Mr. W. Clark Jackson, with Major W. Morland Fox as runner-up.

Radio Heating in Industry

An Exhibition of Redifon Radio Heating, in which the principles of radio frequency are applied to industrial processes, was opened at Dorland Hall, London, on Sept. 20. In opening the exhibition, Sir John Anderson said the restoration of our industrial supremacy and the rebuilding of our exports would depend not only on the intensiveness of the labour and the number of hours devoted to the work, but upon the extent to which scientific discoveries, especially those developed and perfected during the war, were applied to industry.

The exhibition is designed to show how radio frequency power can be used for the heating of materials and components by the generation of heat directly through the substance under treatment with an intensity and uniformity not attained from external sources. In the dielectric heating of non-conductors, such as plastics, glues, wood, rubber, asbestos, clay, &c., the materials are placed between two metal plates which act as electrodes. A high-frequency alternating current passed between the plates rapidly produces heat in the substance under treatment. In the case of eddy current heating, where heat is to be applied to conductors, either ferrous or non-ferrous metals, a modified method of application is used. The two plates are replaced by a coil. When a high-frequency alternating current is passed through the coil and the object to be heated is placed in the electrical field produced, intense heat is quickly absorbed by the object.

While no claims are made for the extensive application of radio heating in the sphere of cooking, the visitors at the opening of the exhibition were invited to partake of hot sandwiches—a regular mid-morning item in the staff laboratories of Rediffusion, Ltd.—heated in small "radio" heaters designed for the treatment of mouldings in plastics, rubber, and other materials. Our sandwich was, in fact, only warm; nevertheless we enjoyed the show immensely.

Heat Recovery from Flue Gases

There are, of course, a number of ways of recovering and using waste heat from furnace flue gases. But whether, and to what extent, it might be possible to recover the heat depends on economic factors and on technical considerations. The answer is influenced by such things as the size of the installation; the cost of the heat recovered in relation to the cost of other sources of supply, and the possible uses to which the heat might be put. A new bulletin from the Ministry of Fuel and Power goes thoroughly into the whole question, providing specialist knowledge on this important subject. It is a further valuable aid to fuel economy and a higher standard of efficiency of fuel usage.

The opening section of the bulletin provides a guide in obtaining information on what one might expect to gain in total recoverable heat. The next section summarizes the ways in which the heat can be recovered according to the type of furnace in question. Then follow sections dealing in detail with recuperators and regenerators and with waste heat boilers. The application of waste heat boilers covers the Gas Industry. A final section offers advice on the question of whether or not to use economizers with waste heat boilers.

The Bulletin is No. 42 of the fuel efficiency series, and copies are obtainable from the Regional Offices of the Ministry of Fuel and Power.

The Autumn Meeting of the North of England Gas Managers' Association will be held in the Demonstration Theatre of the Newcastle and Gateshead Gas Company, Newcastle, at 2.30 p.m. on Oct. 5, and will be addressed by Mr. A. E. Sylvester, Chairman of the British Gas Council. By the kindness of the Tyne Improvement Commissioners, a river trip has been arranged for the morning, and luncheon will be served on the launch.

The Autumn Meeting of the Eastern Counties' Gas Engineers' and Managers' Association, originally fixed for Oct. 17, has been unavoidably postponed until Monday, Oct. 29.

A **Meeting** of the Institute of Fuel (London Section) will be held at the Institution of Mechanical Engineers, Storey's Gate, S.W., on Oct. 3, at 6 p.m., when Mr. M. W. Thring will read a Paper on "The Effect of Output on the Thermal Efficiency of Heating Appliances."

Association of Public Lighting Engineers:

Glasgow Conference

A highly successful three-day Conference was held in Glasgow from Sept. 11 to 13 under the Presidency of Mr. E. J. Stewart, Lighting Engineer to the Corporation of Glasgow. All arrangements had been made for a Conference in Glasgow in September, 1939, but this had to be cancelled on account of the war. There was an attendance of some 1,000 officially appointed delegates and visitors from all parts of the British Isles, and although limitations of space prevented large displays, there was an excellent exhibition of lighting apparatus and fittings at the Corporation Lighting Department premises at 20, Trongate.

On Tuesday, September 11, the Lord Provost of Glasgow (Mr. James Welch) gave the Association a civic welcome at the Royal Technical College, and expressed his added pleasure in doing so as this Conference celebrated the coming-of-age of the Association.

Mr. E. C. Lennox (Past-President) thanked the Lord Provost, and at the same time expressed appreciation of the great trouble and expense to which the Corporation and its officials were put in preparing for the abandoned Conference in 1939.

Mr. S. B. Langlands, a previous Inspector of Lighting in Glasgow, and Captain W. J. Liberty, formerly Inspector of Lighting to the City of London Corporation—and both founders of the Association 21 years ago—then gave a brief account of the conditions of street lighting in those days, and earlier, and commented on the great developments that have taken place since.

The annual general meeting followed, when the Hon. Treasurer (Mr. H. C. Brown) submitted the accounts.

The result of the ballot for officers and Council for the coming year was as follows:

President: E. J. Stewart (Glasgow).

Vice-President: W. N. C. Clinch (Northmet. Power Co.).

Members of Council: J. F. Colquhoun (Sheffield), H. V. Emptage (Margate), N. Boydell (Eastbourne), E. C. Lennox (Newcastle-upon-Tyne), Robert Lee (St. Pancras), H. Pryce Jones (Brighton), A. S. Tapsfield (City of London), T. Wilkie (Leicester), and C. I. Winstone (Gas Light and Coke Co.).

Hon. Treasurer: H. C. Brown (Gas Light and Coke Co.).

Considerable discussion took place upon proposals by the Council for altering the constitution of the Association. The various points brought up will be considered by the Council, and a final draft will be sent to the members prior to the calling of a general meeting for a final decision.

It was explained on behalf of the Council that the aim is to conduct the affairs of the Association in future on the lines of a professional body, and one step in that direction is a proposal to call the Association "The Institution of Public Lighting Engineers." This proposal is now before the Board of Trade, but no decision has yet been arrived at by the Board.

With the same object of improving the status of the Association and of lighting engineers as a body, modifications are proposed in regard to qualification for membership. Hitherto there have been no special qualifications, and while the Council does not think the time has yet arrived to institute an examination scheme, it is proposed that full membership shall only be granted to those who hold the Diploma of the Association, or are at least 30 years of age and hold a responsible position in connexion with public lighting as heads of public lighting departments which control not less than 1,000 lamps and, in addition, are associate members of the Association. Alternatively, corporate membership of the Institution of Electrical Engineers, the Institution of Gas Engineers, or the Institution of Mechanical Engineers may be deemed by the Council to be sufficient qualification, while the Council may also admit to full membership other persons whom they consider have had suitable education and training in public lighting and have rendered service to public lighting.

Proposals are also made with regard to admission to associate membership, associates and students, and the present classification of "junior members" is to be abolished. The whole object is to bring the constitution of the Association more into line with the older engineering institutions. Alterations to subscriptions are also recommended.

In the afternoon of Tuesday, Sept. 11, the President delivered his Address.

After a vote of thanks had been given to the President, Mr. R. Kelf Cohen (Director, Gas and Electricity Division, Ministry of Fuel and Power) spoke to the Conference regarding the circular issued to local authorities on August 22, urging them to shut off public lighting at mignight in order to economize in the use of coal. He said it was fully appreciated that lighting engineers had been waiting through six years of darkness for the opportunity to resume their work and to improve street lighting generally. The Minister greatly regretted having to take the step of asking for a reduction of street lighting, but it was necessary as a temporary measure, and with the present fuel shortage it was manifestly against public interest that street lighting should be the only form of fuel consumption in which there was a full return to peacetime standards at once. At the same time, it was Mr. Shinwell's policy to step up coal production to the utmost. There had been a good deal said to the effect that the economy in street lighting asked for really did not matter very much from the point of view of coal consumption, because it represented only about 1% of the coal consumption of the country. If anything, 1% was slightly on the high side, but it must be borne in mind that from the point of view of coal supply every additional demand, however small, became very serious indeed, and it was true that the resumption of street lighting to peacetime standards placed on the Ministry the responsibility of finding something like another million tons of coal, and if that could be halved it would, in present conditions, considerably ease the task of the Ministry in this respect.

Economies in the use of fuel generally had been accomplished with the willing co-operation of millions of consumers of solid fuel and also of gas and electricity, and the Ministry was now relying on that co-operation to a greater degree than ever because no way had yet been devised of controlling the use of gas and electricity.

Mr. J. F. Colquhoun (Sheffield), commenting on the small saving that would be effected by what had been suggested in the Circular, suggested that a sense of proportion was necessary. The amount of coal used for street lighting in Sheffield was 21,000 tons per annum, whereas the domestic consumption was of the order of 600,000 tons per annum. Therefore, even if the whole of the coal used for street lighting could be saved, it would only represent a little over 3% of the domestic consumption. By the proposal of the Minister, the saving would be from 1 to 1½%, and if he had any grumble against the Circular it was that it came after local authorities had been urged for years by every Government Department to get their street lamps ready.

Mr. H. Midgley (Plymouth) pointed out that in most parts of the country in October it would be dark at 7 o'clock in the evening, and if the lamps were turned off at midnight it would be impossible for practical reasons to put them on again. Where the lighting was manually operated there was not the labour, and where clocks were used they could not be arranged for double switching. What did the Ministry propose should be done when that time arrived in order to avoid danger in the streets?

Alderman Thraves (Chairman, Watch Committee, Sheffield) urged that every effort should be made to carry out the Minister's request, and a number of other speakers took the same view. One suggestion was that all public lighting should be shut off for the five weeks before the longest day and the five weeks after the longest day, and that during that time coal stocks should be built up.

Alderman R. Bushby (Burnley) said his Corporation had put into operation a scheme which saved more coal than that asked for by the Minister, for they cut off all street lighting at 11 p.m., and in some side streets the lighting was cut off altogether.

Councillor A. Rostance (Brighton) said that in view of the promise given by the miners' union that if they were promised nationalization they would get more coal, why was not more coal forthcoming?

Mr. Kelf Cohen, replying to the comments, said the Ministry was not competent to work out arrangements for 1,700 local authorities, but he suggested that each should work out its own arrangements according to its circumstances, and if there were special difficulties owing to the nature of the area, then the matter should be discussed with the Ministry. In a town like Liverpool, for example, with its many miles of docks and movement of traffic all night, the conditions were very different from many other places, but he suggested that the maximum economy that could be effected was the maximum that was required.

A Paper on "Glasgow's Street Lighting" was then presented by J. M. Ward.

On Wednesday, Sept. 12, the following Papers were read and discussed: "Lighting of Bends, Junctions, and Roundabouts," by Francis F. Middleton; and Dr. T. W. J. Walsh outlined the work of the Drafting Sub-Committee of the main Committee of the British Standards Institution which is dealing with the specification on street lighting, to implement the Ministry of Transport Report of 1937. On Thursday, Sept. 13, two further Papers were read and discussed: "Engineering Principles in Street Lantern Design," by T. S. Smyth and J. G. Christopher, and "The Commercial Aspect of Public Lighting," by E. S. Harris.

Mr. B. A. P. Winton Lewis will read a Paper on "The Engineer and the Housing Problem" at a meeting of the Society of Engineers in the Geological Society's rooms at Burlington House on Oct. 1 at 5 p.m.

Denny Gas Department has reported a total revenue of £30,910 for the past year, a record for the undertaking. A net balance of £766 brought the total available surplus to £817. In view of the large increase in the price of coal and production costs the Council has deferred the question of reducing the price of gas.

Glasgow Public Lighting Exhibition

ON the occasion of the annual meeting of the Association of Public Lighting Engineers at Glasgow on Sept. 11–13 an interesting exhibition of public lighting equipment, the first of its kind since pre-war years, was held in the Glasgow Corporation Lighting Department. Exigencies of space prevent us from giving more than the following general glimpse of the stands on which there were exhibits of interest to gas lighting engineers.

BRITISH, FOREIGN, AND COLONIAL AUTOMATIC LIGHT CONTROLLING CO., LTD.—A selection of time switches and gas controllers representative of a wide range was shown on this stand. The model G.F. 10 amp. time switch introduced in 1939 can be supplied in 16–21 day hand-wound or synchronous self-starting motor drive. The synchronous model when fitted with Solar dial becomes entirely automatic, closing and opening the contacts at sunset and sunrise without any manual attention. The "Gunfire" gas controller, found wherever the automatic control of gas presents a problem, was shown in upright and suspension types, with gradual or quick action, and with detachable clocks.

CONCRETE UTILITIES, LTD.—A set of water colour drawings depicted a variety of reinforced concrete column designs, including the "Arc" series of brackets, the only two concrete designs approved by the Royal Fine Arts Commission. A concrete bollard typified hundreds which have been installed during the war period. A typical lamp column base, only 9½ in. across, showed the reinforcement and door fitting. Another interesting device was a composite concrete lantern head, cast as part of the concrete bracket, and designed to accommodate a special ring which holds the lamp holder and refractor. The unit is mainly for Class B lighting, but a larger head is in preparation.

WILLIAM EDGAR & SON, LTD.—Owing to lack of space this firm showed only one lantern, the "Rivercourt," which was developed just prior to the war and had never been shown previously. Other types manufactured by the firm are the "Eclipse," which can be arranged for both suspension and upright fixing, and the "Caxton" range of square and circular lanterns, all of which can be fitted with distance or clock controls if required.

LIGHTING TRADES AND WELSBACH, LTD.—An important and interesting invention from the research laboratories of the North Middlesex Gas Company, directed by Mr. F. Dawson, was on public view for the first time. Known as the "Penumbra Internal Reflecting Prism," the device is applicable to both gas and electric public lighting fitments, especially those in which the light source is brilliant and linearly extended. The invention comprises a transparent triangular prism placed with one face parallel to and its length in line with the source of light, which may, for example, comprise three Bijou or No. 2 gas mantles arranged in line on a common superheater. Light from the mantles falling on the top horizontal surface of the prism after refraction into the body of the prism is totally internally reflected and diverted laterally so as to emerge from the inclined sides of the prism in a more or less fan-shaped beam, the depth and spread of which are governed by the geometry of the arrangement and by the optical properties of the prism. The effect is to level out the undesirable patch of light immediately under the lamp by the scientific use of the penumbra principle, and to use this light to increase the illumination at a distance laterally from the column, thereby giving a much more even and pleasing illumination without glare or discomfort, which improves visibility. The lateral improvement is quite striking, and the effects that can be produced are extremely flexible both as to spread, intensity and position of the resultant beam. The invention of this device, which economizes in light in that any given luminous output from a suitable light source can be much more effectively utilized than hitherto, is claimed to be an outstanding development in street lighting. Curves and full quantitative data as far as at present accumulated were available on the stand.

GOWSHALL, LTD.—The exhibit on this stand comprised in the main illuminated "Keep Left" guardposts and signs, all of which can be used for gas illumination. Simplicity in design coupled with standardized components and glass panels, available from stock, make for economical installation and maintenance. Any part that becomes damaged can be replaced in a few minutes by semi-skilled labour, and mantle inspection or renewal and cleaning is made easy by allowing complete access to the lanterns.

HOLOPHANE, LTD.—The Holophane exhibit was concerned principally with the correct planning of sheet lighting utilizing the wide range of Holophane glassware available for the purpose. In connexion with the conference, a special booklet had been prepared entitled "Street Lighting by Holophane" covering the principal problems involved. Included in the leaflet are a number of specimen layouts showing how particular kinds of streets can best be lit. Also on the stand were further examples of street lighting results and some examples of the equipment used.

HORSTMANN GEAR CO., LTD.—Manufacturing limitations imposed by the necessity for continuing certain vitally important productions made it necessary for the Company to limit the manufacture of control equipment for public lighting to the models displayed, which were: Controllers, Models 3A/UNI, 15/3A, and 15/3A/COM; Comet ignition devices, Marks III, VI, and VII, together with the G.L.C. pattern relay valve. The models on view were from ordinary output, and were representative of normal productions. Quality has in no way deteriorated through restrictions on raw materials; in fact, owing to the introduction of improved techniques resulting from war experience, detail improvements have been made without interfering with interchangeability. The patented Solar dial, which is an optional feature of Newbridge gas controllers, is of particular value in the case of long run models. No attention is required between windings, and correct variations in lighting and extinguishing times take place automatically. When necessary, dials can be supplied to give a fixed (manually adjustable) extinguishing time throughout the year, the lighting time following automatically the particular schedule. Special schedules to meet specific requirements can also be arranged.

KEITH BLACKMAN, LTD.—The exhibits on this stand included a small "Keith" rotary compressor, with direct coupled electric motor, with a capacity of 200 cu.ft. of gas per hour at 3 lb. pressure; the "Supervia" high pressure gas lamp specially suitable for street lighting from bracket arm or centrally suspended, fitted with axial or non-axial refractor; the "Keith" high pressure 1,000 c.p. "squat" pattern lamp for street or shop front lighting; the "Keith" 1,000 c.p. high pressure gas decorative lamp, principally for shop fascia lighting; the "Keith" 1,000 c.p. high pressure gas lamp for column fixing; the "Keith" raising and lowering gear, complete with winch, handle, and temporary connexion; and an underground pattern cock for use with lamps on raising and lowering gear or raising, lowering and traversing gear, for testing lamps at ground level.

POLES, LTD.—The ideals of simplicity, efficiency, refinement, avoidance of pretentiousness and vulgarity were exemplified in the lighting standards illustrated in figs. 1 and 2. The introduction of the tapering hexagonal section is a new departure in the manufacture of steel columns. It is a development of the tapering circular standard which received the highest commendation from the Royal Fine Arts Commission in their adjudication of the designs submitted in 1939. Fig. 1 illustrates a column with a 25 ft. mounting height and an outreach of 5 ft. Detailed improvements include extra heavy gauge metal for the manufacture of the sections themselves, and special consideration has been given to the design of a completely detachable slotted steel instrument panel. This is fitted inside the column near the ground level for fixing auxiliary apparatus used in connexion with gaseous discharge lighting, remote control equipment, fuses and switches, raising and lowering gear winch, &c. Access to the interior of the pole is obtained through an unobtrusive door which can be supplied with a simple locking device or a six lever lock. The base plinth can be cast *in situ* by means of standard steel shuttering. Alternatively a separate cast iron base can be supplied. Fig. 2 shows the hexagonal standard specially designed for vertical lanterns at 15 ft. mounting height. It can be supplied with a large base fitted with the standard slotted steel panel and door as previously described. Swan-neck arms and other similar brackets are available. The columns are galvanized by complete immersion in hot spelter after manufacture, to ensure maximum protection. Enamelled finish is available if desired, and where this is applied, the galvanized surface is epecially treated to ensure efficient bonding of enamel and spelter. Models of the standards described were on view. The standards are "Adastra" products manufactured by Poles, Ltd.

FIG. 1.

FIG. 2.

W. PARKINSON & CO., LTD.—Similarity in design is maintained in the " Maxill," "Maxilla," and "Maxillette" types of lanterns. This preserves the uniform appearance associated with ordered planning, and avoids the impression of random layout induced by a variety of lantern designs. Three sizes of lanterns have been selected; the "Maxill," mounting height of 25 ft. for Group "A" roads, housing from six to twelve mantles and arranged either for suspension or upright fixing; the "Maxilla," mounting heights of 13 to 15 ft. for Group "B" roads, housing from two to six mantles, and arranged for suspension or upright fixing; and the "Maxillette," mounting heights of 11 to 13 ft. for residential and service roads, housing from one to three mantles, and designed only for upright fixing. The lanterns are square in plan, with vertical sides to allow for the incorporation as an integral part of the lantern, of all reflectors, clock controllers and ignition devices. The controls are concealed behind or beneath the reflectors, and the result is a compact and self-contained unit. The adoption of specially processed ferrous metal has resulted in the construction of a sound and durable framework with very narrow

(*Concluded on p. 443*)

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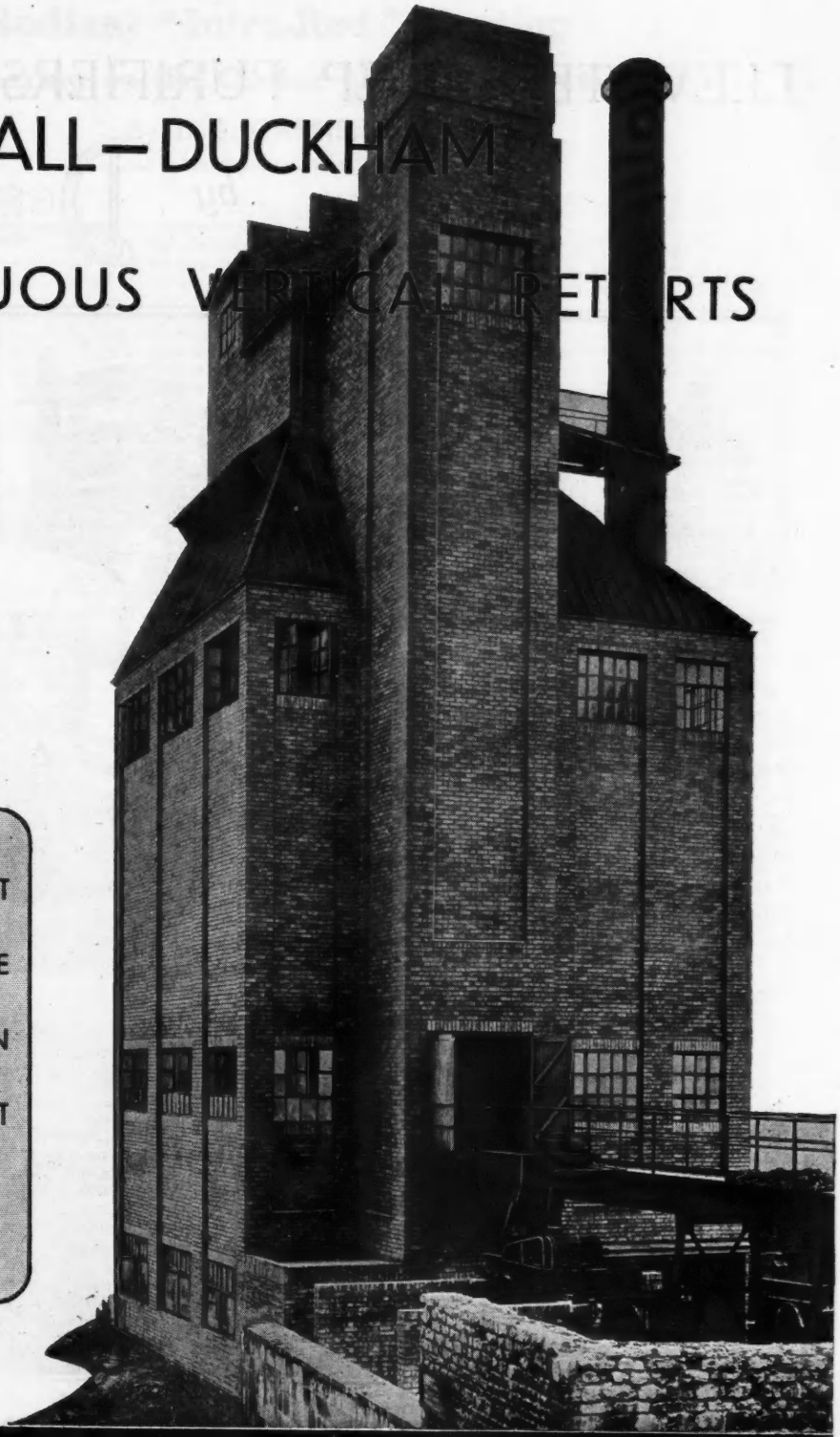

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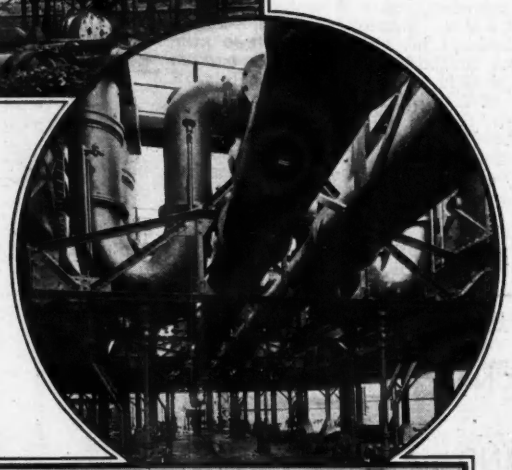

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Influence of Natural Convection on the Effectiveness of Radiant "Infra-Red" Heating

Its Bearing on the Choice of Heating Systems

By J. B. CARNE, B.Sc.

South Metropolitan Gas Company

Summary

Attention is drawn to the necessity of considering the convection loss from heated objects during "infra-red" processing. The dependence of the magnitude of this loss on the curvature of the object surface and its relatively greater magnitude for sharply curved objects are pointed out. The results of an experimental investigation of the effect are detailed and shown to confirm deductions from published heat transfer data. Paint processing observations supporting the temperature data obtained are also given. It is concluded that high temperature air is essential to the economic heating of sharply curved objects, and to the attainment of uniform temperatures where objects of various curvatures or differing absorbing properties for the radiation employed are heated simultaneously in the same oven. Suggestions as to the form of test objects used in measuring the performance of radiant ("infra-red") ovens are made.

ALTHOUGH in recent literature dealing with "infra-red" heating reference is to be found to the advantage in certain circumstances of convective heating over infra-red heating, no physical criterion or precise information for estimating the suitability of either system or of a combination of them for a particular heat treatment is to be found. Physical considerations in the case of infra-red heating show that the magnitude of the convection loss from the heated object relative to that of the radiation absorbed by it is all-important. Fundamental to this relation is the dependence of the convection loss from an object on its curvature, a factor in infra-red heating technique which appears to have received little, if any, attention. Its importance became strikingly manifest in the extreme difficulty experienced of drying paint on thin rods when these were surrounded by unheated air and irradiated by electric infra-red lamps, although the same painted rods dried rapidly when exposed to infra-red radiation in a gas-fired radiant heat cabinet. The explanation advanced, that the high rate of convection from the thin rods was accentuated in the case of the relatively cool air of the electric system, and resulted in an equilibrium temperature of the rod below the processing temperature of the paint, is supported by the fact that the same paint on flat plates dried rapidly in both electric and gas infra-red ovens.

Equilibrium Temperature

In most heating processes it is not only desirable but also essential to raise the temperature of the object of treatment above a certain minimum temperature in order to bring about desired physical or chemical changes. Advantageous use of infra-red heating is due chiefly to the rapid attainment of the specified temperature which such systems can effect. The emphasis which has been laid on the absorption of radiation has somewhat obscured the role of convective loss, although it is equally important in determining the maximum temperature attainable by the object under treatment. The paramount importance of the capacity of an oven to raise the object under treatment to an adequate temperature is evident from the fact that while the rate of temperature rise effected merely controls the rate of throughput of the oven, failure to raise the object to the minimum processing temperature renders the heating system wholly unsuitable for its purpose. Since therefore the attainable temperature is a prime characteristic of an oven, attention here is given mainly to the physical factors on which this depends.

Calculation of Equilibrium Temperature from Heat Transfer Data

Exchange of heat between the object of treatment and its surroundings takes place almost entirely by radiation and convection according to well-established laws. Equilibrium thermal conditions result when the gain of heat by the object of absorption of radiation is balanced by the loss from it due to convection. The quantities can be expressed mathematically as follows:

(i) Radiation absorbed per hour $H_R = K.E. (T_e^4 - T_o^4)$

(ii) Convection loss per hour $H_C = A (T_o - T_a)^{5/4}$

where H_R = Net heat transferred by radiation to the object in B.Th.U./hr. per sq.ft.

K = Radiation constant = 16×10^{-10}.

E = Absorption coefficient of surface of object = (0.9 for black paint).

H_C = Heat loss by convection from object B.Th.U./hr./sq.ft.

A = Convection coefficient (see fig. 1).

T_o = Temperature of object, °F.

T_a = Temperature of ambient air, °F.

T_e = Equivalent radiant temperature of oven walls, °F.

The convective loss per unit area is greater for convex surfaces than for flat surfaces, the coefficient "A" increasing rapidly with increase of curvature for cylinders of less than 2 in. in diameter. The curves of fig. 1 which show graphically the co-efficient of convection "A" for horizontal and vertical cylinders, and for flat plates of dimensions met in heat-processing practice, have been constructed from published data (1), (2).

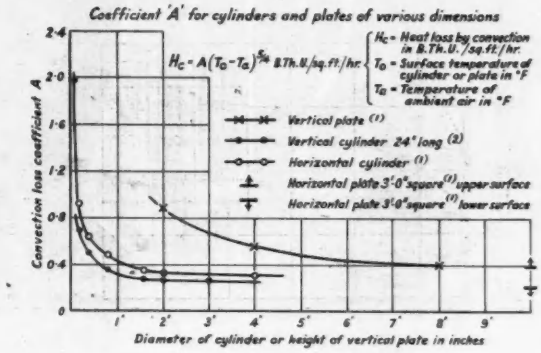

Coefficient 'A' for cylinders and plates of various dimensions
$H_C = A(T_O - T_a)^{5/4}$ B.Th.U./sq.ft./hr.
H_C = Heat loss by convection in B.Th.U./sq.ft./hr.
T_O = Surface temperature of cylinder or plate in °F
T_a = Temperature of ambient air in °F
Vertical plate (1)
Vertical cylinder 24" long (2)
Horizontal cylinder (1)
Horizontal plate 3'-0" square (1) upper surface
Horizontal plate 3'-0" square (1) lower surface
Convection loss coefficient A
Diameter of cylinder or height of vertical plate in inches

FIG. 1.

Heat transfer by conduction being of negligible proportions, it is clear that at the equilibrium temperature the gain by radiation is balanced by the loss by convection, and thus,

$$H_R = H_C$$

i.e. (iii) KE. $(T_e^4 - T_o^4) = A (T_o - T_a)^{5/4}$.

Since the radiation absorbed per unit area is independent of the curvature of a surface fully exposed to radiation from all directions,

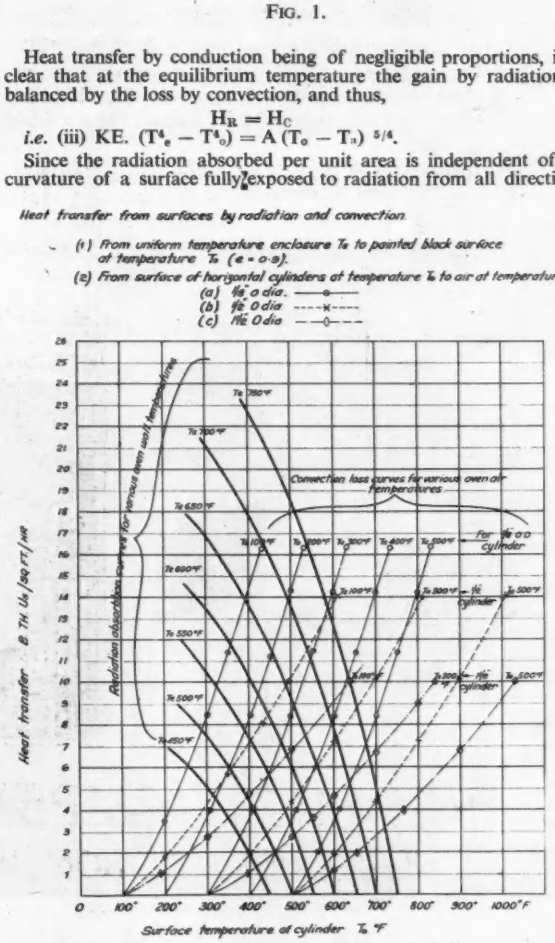

Heat transfer from surfaces by radiation and convection
(1) From uniform temperature enclosure T_e to painted black surface at temperature T_o (e = 0·9).
(2) From surface of horizontal cylinders at temperature T_o to air at temperature T_a
(a) ½" O dia.
(b) ¼" O dia
(c) ⅛" O dia
Radiation absorption curves for various oven wall temperatures
Convection loss curves for various oven air temperatures
Heat transfer — B Th Us/sq ft/hr
Surface temperature of cylinder T_o °F

FIG. 2.

while the heat loss by convection is greater for curved than for flat surfaces, it follows that convection losses play a greater part in determining the equilibrium temperature of curved objects than of those with flat surfaces. It also follows that reduction of convective loss by increase of ambient temperature will be more marked the greater the curvature of the surface.

The solution of equation (iii) for the equilibrium temperature, T_c, of the object is conveniently found graphically by the intersection of the radiation gain and the convective loss curves constructed from the equations (i) and (ii).

Such curves are drawn in fig. 2 for the absorption of radiation and the loss by convection for cylinders of various diameters held horizontally in ovens having various wall and air temperatures.

The effect of change of oven wall and air temperatures on the equilibrium temperatures of cylinders of various diameters, as determined from the curves of fig. 2 is seen in the curves of fig. 3.

Calculated variation of equilibrium temperature with diameter of horizontal cylinders in ovens with various air and wall temperatures.

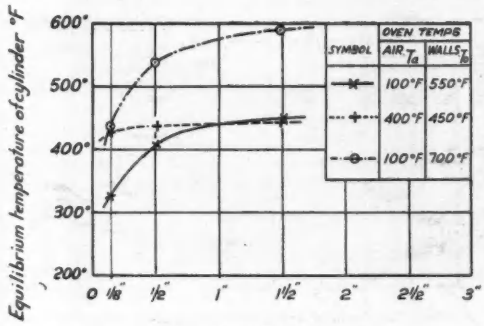


FIG. 3.

The Measured Effect of Convection on the Equilibrium Temperature and on the Rate of Temperature Rise

The Oven.

An experimental replica of the gas-fired radiant heat cabinet illustrated in fig. 4 was used for all measurements.

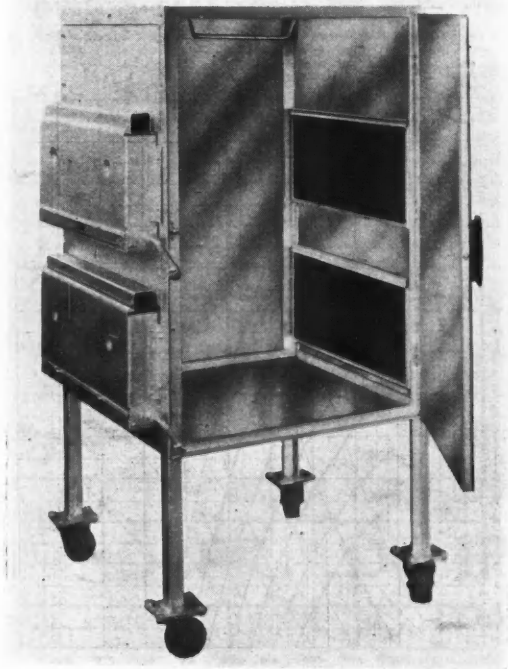
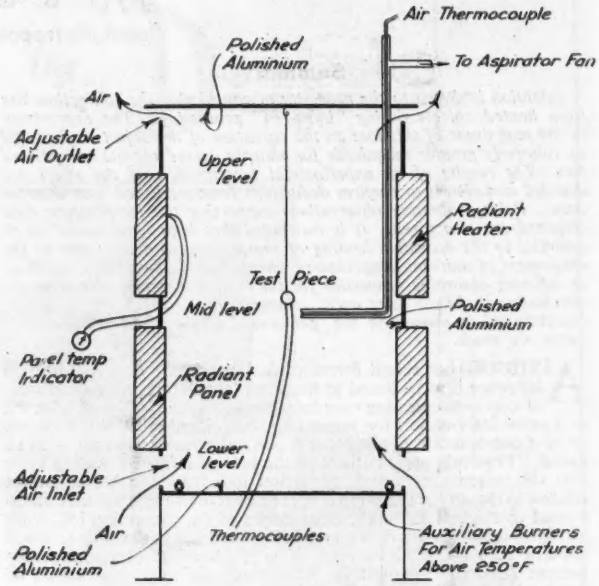


FIG. 4.—*A Four-Unit Gas-Fired Radiant Heat Cabinet.*

Oven air temperatures up to 250°F. were obtained by restriction of the ventilation of the oven by adjustment of the lower and upper openings of the cabinet. Oven air temperatures above 250°F. were obtained by burning gas in auxiliary burners placed inside the oven. The air temperature at low, middle and high levels in the oven, as indicated in fig. 5, was explored, measurement being made by using a fine (38 S.W.G.) thermocouple over which the oven air was rapidly aspirated. At each level and at distances of more than 2 in. from the oven walls the air temperature was found to be constant to within 15°F.



Diagramatic Section of
EXPERIMENTAL OVEN

FIG. 5.

Object Temperature Measurement.

The test objects used for this purpose were copper tubes and flat plates, each 16 in. long and painted black. The surface temperatures of them were taken at intervals of one minute by measurement of the E.M.F. developed in two fine (40 S.W.G.) thermocouples soldered to the objects at points 10 in. apart.

Radiating Panel Temperature Measurement.

A 26 S.W.G. thermocouple secured to the radiating surface of one of the radiant panels was used to read directly on a calibrated voltmeter the temperature of the panel. The reading so obtained served as an indication of the mean temperature of the panel, which was found to be approximately directly related to the equivalent radiant temperature of the oven.

Paint Drying Observations.

Tubes and plates painted with an oil base paint and a synthetic heat transformable paint were heated in the oven having various panel and air temperatures. Results obtained were similar with both paints, and those recorded in Table I with an oil base paint can be taken as relatively typical.

TABLE I.

Test.	Article Treated and its Dimensions.	Oven Conditions. Air Temp.	Equivalent Radiant Temp.	Time of Exposure.	Paint Condition after Stoving.
(A)	U section rod $\frac{3}{32}$ in. dia.	115°F.	650°F.	5 min.	Very soft.
(B)	Ditto	115°F.	650°F.	15 ,,	Not fully hardened.
(C)	2½ in. O.D. tube, vertical, and ends open	115°F.	650°F.	5 ,,	Not fully hardened, but harder than (B).
(D)	2½ in. O.D. tube, vertical, and ends closed	115°F.	650°F.	5 ,,	Hard. Satisfactory.
(E)	Flat plate, vertical, 10 in. by 6 in.	115°F.	650°F.	2 ,,	Hard. Satisfactory.
(F)	U section rod $\frac{3}{32}$ in. dia.	260°F.	675°F.	3 ,,	Hard. Satisfactory.
(G)	2½ in. O.D. tube, ends open, vertical	260°F.	675°F.	2 ,,	Soft.
(H)	2½ in. O.D. tube, vertical, ends closed	260°F.	675°F.	2 ,,	Hard. Satisfactory.
(I)	Flat plate, vertical, 10 in. by 6 in.	240°F.	675°F.	1 min.	Hard.

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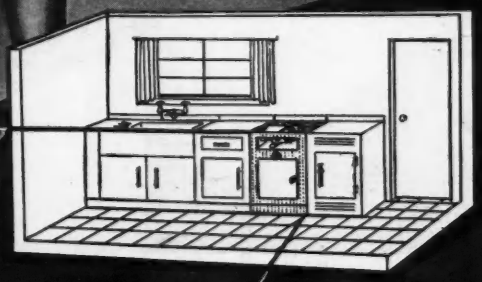

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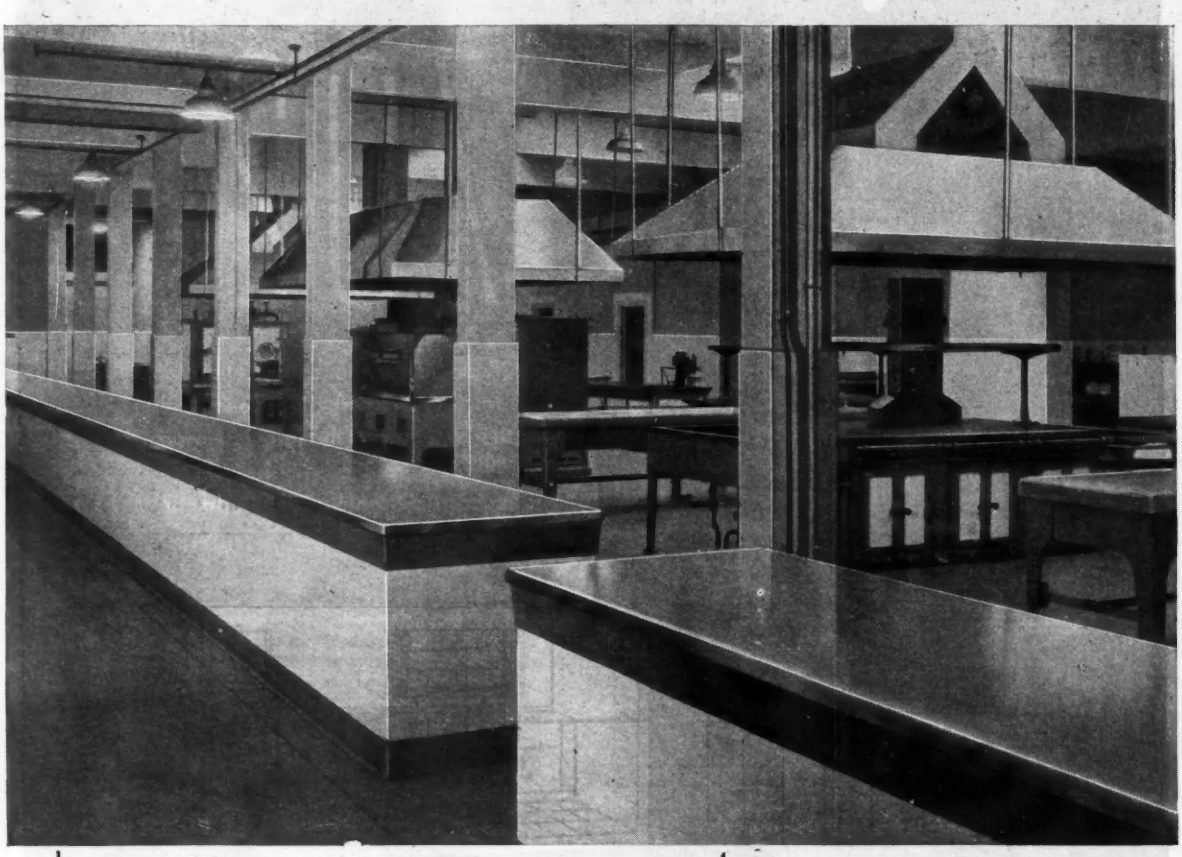

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Discussion of Results

Equivalent Radiant Temperature of the Oven.

As in the case of all ovens composed of unit heaters, the oven is not a uniform temperature enclosure, to which only the formula (i) is strictly applicable, and in consequence the equivalent radiant temperature of the oven is considerably below that of the radiating elements. Extreme difference between the equivalent radiant temperature of the oven and the actual temperature of the radiating elements is to be found in the case of electric lamp systems, where they may be of the order of 500°F. and 5,000°F. respectively. It is here to be noted that undue advantage has been attributed to high temperature elements by authors who, whilst emphasizing the rapid increase of radiation per unit area with increase of temperature (as expressed in the 4th power law of radiation), have omitted reference to the accompanying increase in convection loss and reduction in radiating area of the filament which results from the use of smaller diameter filaments necessarily employed to obtain higher temperatures.

In the oven used for the tests the area of the radiant panels was approximately 15% of the total interior surface of the oven, and the highly reflective character of the remaining 85% of the surface appreciably raised the equivalent radiant temperature. From the measured equilibrium temperature of the tubes and the corresponding ambient air temperatures it is deduced from the curves of fig. 2 that the equivalent radiant temperature of the oven as used in the tests were as given in Table II.

TABLE II.

Oven Temperatures. Air Temp. Mid. Level.	Radiant Panel Temp.	Equivalent Radiant Temp. of Oven Walls.
360°F.	780°F.	455°F.
120°F.	980°F.	510°F.
230°F.	970°F.	530°F.
360°F.	980°F.	565°F.
500°F.	970°F.	575°F.
150°F.	1,170°F.	630°F.
230°F.	1,140°F.	675°F.
125°F.	1,290°F.	670°F.
130°F.	1,380°F.	720°F.

Measured variation of equilibrium temperature with dimensions of cylinders and plates in ovens with various air and wall temperatures.

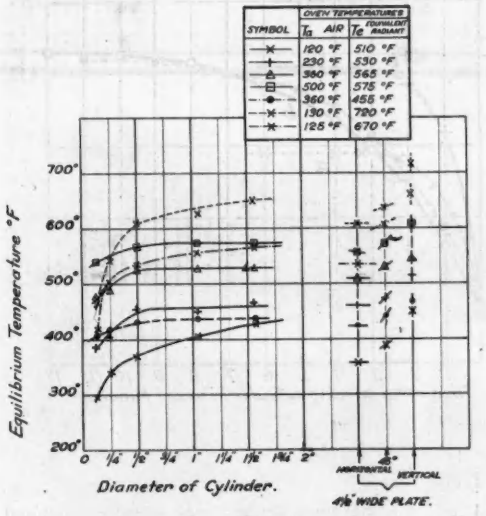

FIG. 6.

Effect of Oven Air Temperature on Equilibrium Temperature.

The curves of fig. 6, constructed from experimental data, closely resemble the calculated curves of fig. 3, and from them it is seen that at low ambient air temperatures the equilibrium temperature of a cylinder decreases rapidly as the diameter of the cylinder decreases below 1½ in. It is also evident that this difference between the equilibrium temperature of cylinders of various diameters increases as the radiant temperature of the oven is raised and decreases with increase in temperature of the ambient air. The observed relations between these factors for horizontal cylinders of ¼ in. and 1⅝ in. diameter and for a ¼ in. cylinder and a vertical plate are plotted in curves of figs. 7(*a*), 7(*b*), and 7(*c*).

Variation of Equilibrium Temperature with Orientation of Object.

The equilibrium temperatures of a flat plate 4½ in. by 16 in. when it was suspended with its long edge parallel to the radiant panels and with its short edge horizontal, at 45°, and vertical, are plotted for various

Dependence of equilibrium temperature of object on oven air temperature.

(Equivalent radiant temperature of oven 540 °F)

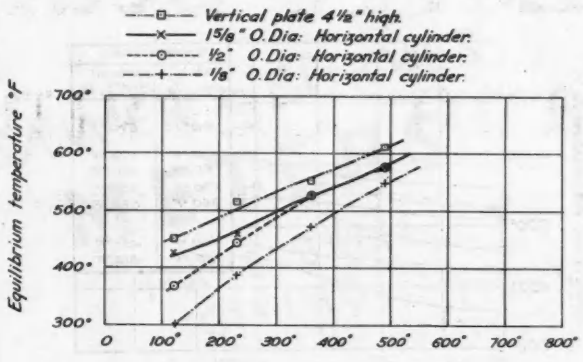

FIG. 7(*a*).

Dependence of equilibrium temperature on equivalent radiant temperature of oven.

(Oven air temperature 120 °F)

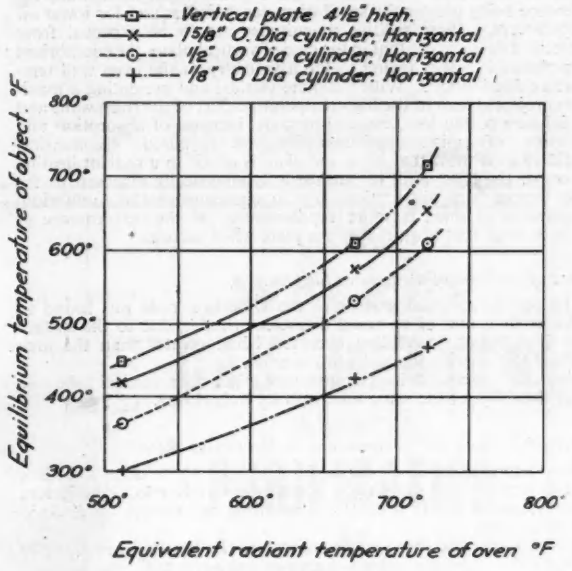

FIG. 7(*b*).

Effect of oven air temperature on diversity of equilibrium temperatures for equivalent radiant temperature of oven of 540°F

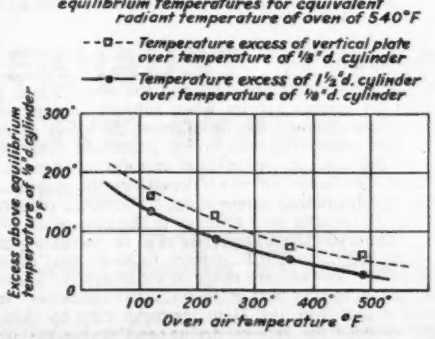
Temperature excess of vertical plate over temperature of 1/8" d. cylinder
Temperature excess of 1½"d. cylinder over temperature of 1/8"d. cylinder
Excess above equilibrium temperature of 1/8" d. cylinder °F
300°
200°
100°
0
100° 200° 300° 400° 500°
Oven air temperature °F

FIG. 7(*c*).

Variation of equilibrium temperature with orientation of a flat plate in oven with various air and wall temperatures.

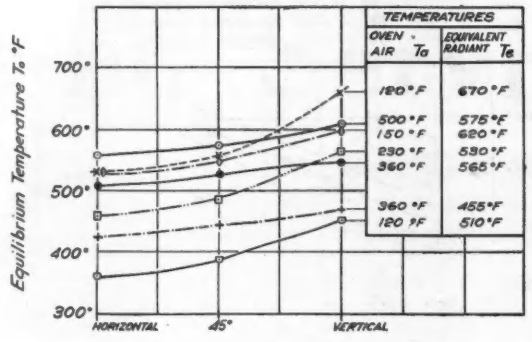

FIG. 8.

oven conditions on fig. 8. It is to be noted that the equilibrium temperature of the plate when vertical was higher than for other orientations, and the difference was greater the larger the difference between the oven air and radiant temperatures.

The equilibrium temperature of a cylinder when vertical was observed to be higher than that of the cylinder when horizontal, the difference being greater for small diameter cylinders and for lower air temperatures. These relative magnitudes are to be expected from convection data, except that in the case of vertical plates the equilibrium temperature is higher owing to the asymmetry of the oven wall temperature distribution. With the plate vertical and presenting a maximum projected area to the high temperature part of the oven walls and a minimum to the low temperature part, increase of absorption and reduction of emission of radiation are favoured. Geometrical considerations show that when the plate is at 45° in a radiant heating system of the type used, its surface is symmetrically disposed to the oven temperature distribution, and in consequence the equilibrium temperature attained is more representative of the performance of the oven than that acquired by the plate when vertical.

Effect of Increase of Convective Surface.

The equilibrium temperature of the U section rods was found to be lower than that of an equal diameter cylinder, due to the surface area from which convection occurred being greater than the area exposed to the radiating walls of the oven.

Similarly the equilibrium temperature of an open vertical tube was lower than that of the same tube with its ends closed.

Effect of Ambient Air Temperature on Heating-up Rate.

The "temperature-time" curves for $\frac{1}{8}$ in. and $1\frac{5}{8}$ in. diam. cylinders for two sets of oven conditions which respectively effect equilibrium temperatures of 450°F. and 550°F. for the $1\frac{5}{8}$ in. cylinder are given in figs. 9*a* and 9*b*.

It is apparent that the rate of temperature rise for the larger cylinder is nearly the same for a high degree of infra-red radiation and low ambient air temperature as for a relatively medium intensity of radiation and a high air temperature, while in the case of the small diameter cylinder the latter combination effects a faster rate of heating-up and a much higher equilibrium temperature, the latter being almost equal to that attained by the $1\frac{5}{8}$ in. diam. cylinder when heated by either combination.

Processing Observations.

Comparison of the temperature data and the observations of the drying of paints on various articles when subjected to the various oven conditions shows mutual confirmation of the effect of natural convection on heat processing. As to be anticipated, the effect is more evident in the case of typical heat transformable paints, the physical and chemical changes of which depend on the paint reaching a characteristic transformation temperature. The noted reduction in drying time from 30 minutes to 3 minutes in the case of an oil base paint on $\frac{3}{32}$ in. diameter U section rods due to increasing the air temperature from 100°F. to 250°F. suffices to show that even with paints of such a wide temperature range of treatment the convection loss effect may play a decisive part in the successful treatment. Reduction of convection loss from the $2\frac{1}{4}$ in. diameter tube by closing its ends noticeably speeded the rate of drying, and raising the air temperature had a much greater effect on the rate of drying of the thin rod than that of either the flat plate or the $2\frac{1}{4}$ in. diameter tube.

Effect of the Magnitude of "E."

In all the foregoing calculated and experimental data, the heated object has been one with a black surface, having a coefficient of absorption of 0.9. It is evident that for surfaces with lower values of "E," for instance, polished metals, the absorption of heat will be proportionately smaller, and the role of convection correspondingly enhanced.

For short wave infra-red radiation the value of "E" varies appreciably with colour. Maxted[3] showed that flat enamelled plates surrounded by cool air and heated by electric "infra-red" lamps attained equilibrium temperatures, depending on the colour of the enamel, of from 200°F. to 280°F. Clearly such differences would be lessened by raising the ambient air temperature, and practically eliminated by using air at the same temperature as the equivalent radiant temperature of the oven.

Comparison of Temperature - Time curve of $1\frac{5}{8}$" and $\frac{1}{8}$" diameter cylinders in ovens with (a) relatively low air and high radiant temperatures (b) relatively high air and medium radiant temperatures

Cylinder diam.	Symbol	Oven conditions: Air temp.	Panel temp.	Equivalent radiant temperature
(a) $1\frac{5}{8}$"	---●---	120°F	970°F	510°F
$\frac{1}{8}$"	---×---			
(b) $1\frac{5}{8}$"	—○—	360°F	760°F	450°F
$\frac{1}{8}$"	—+—			

Water equivalent of metal per sq. ft. of cylindrical surface	$\frac{1}{8}$" o/s dia.	$1\frac{5}{8}$" o/s dia.
	0·065 lbs.	0·165 lbs.

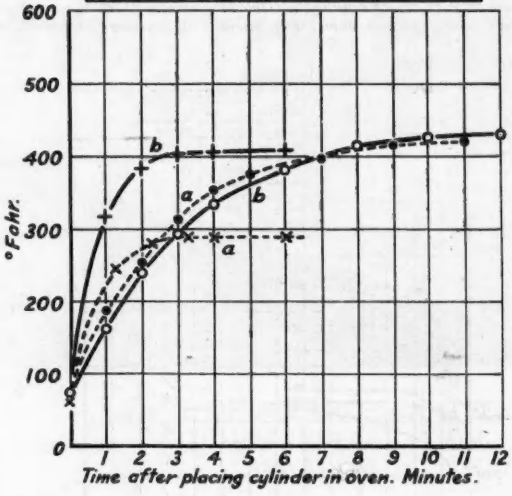

FIG. 9(*a*).

Significance of Observations.

The differences in the maximum temperatures attained by flat and curved objects—in some cases shown here to be as much as 150°F.—in ovens in which the heating is effected chiefly by infra-red radiation show clearly the importance of considering the convection losses from the object, in order to obtain a correct estimate of the suitability of an oven for a particular process.

In processes such as the curing of synthetic paints, where the heating period may be of the order of 4 minutes, it is evident that in an oven with an equivalent radiant temperature of, say, 520°F. and a low air temperature of, say, 100°F., the object temperature is more than the air temperature after the first few seconds of treatment, and consequently for almost the whole period the rate of heating up is retarded due to the convection loss from the object. In the case of the oven with an equivalent radiant temperature of, say, 450°F. and air temperature of 360°F., heat transfer by convection to the object takes place for nearly half the heating period, while in the case of what is commonly termed a convection oven, heat transfer from the oven air to the object takes place throughout the heating period.

It is clear from the foregoing comparisons of the characteristic performances of ovens having various proportions of convection and radiation components, that a prime factor in the choice between convection and infra-red ovens which confronts every prospective

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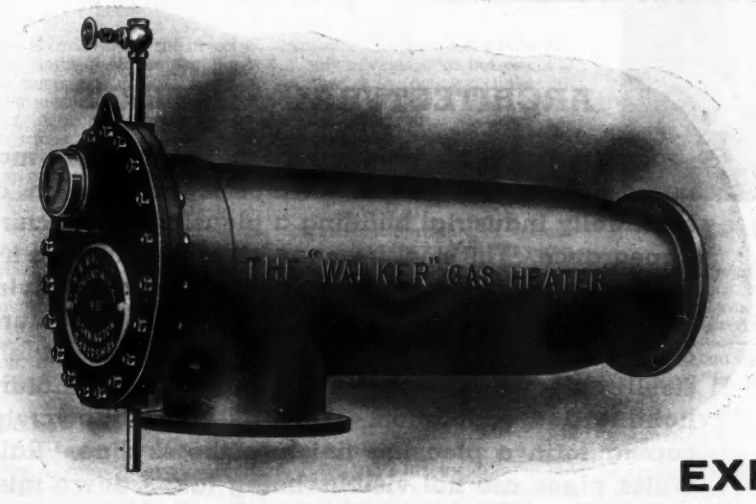

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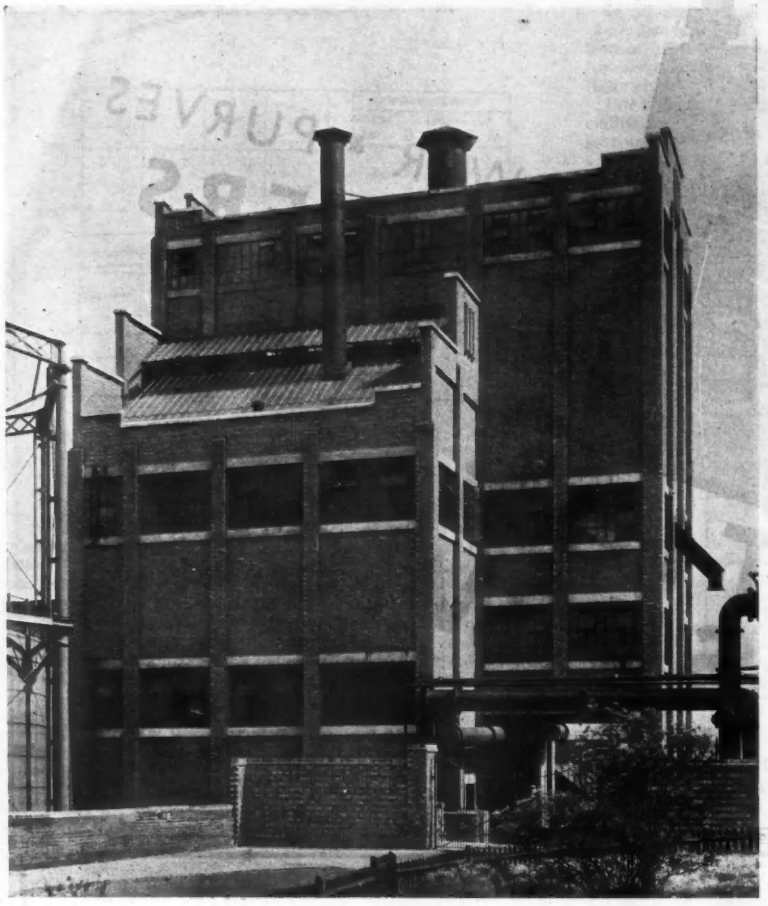

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Comparison of Temperature-Time curve of 1⅝" and ⅛" diameter cylinders in ovens with
(a) relatively low air and high radiant temperatures
(b) relatively high air and medium radiant temperatures

Cylinder diam.	Symbol	Oven conditions: Air temp.	Panel temp.	Equivalent radiant temperature
(a) 1⅝"	---●---	130°F	1300°F	665°F
⅛"	---×---			
(b) 1⅝"	—○—	500°F	970°F	580°F
⅛"	—+—			

Water equivalent of metal per sq. ft. of cylindrical surface	⅛" O/s dia.	1⅝" O/s dia.
	0·065 lbs	0·165 lbs

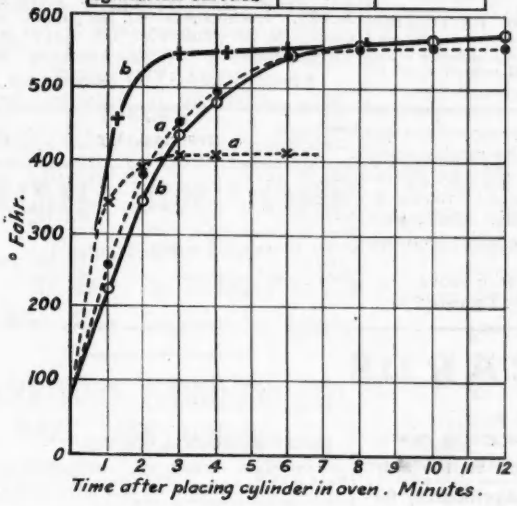

FIG. 9(*b*).

user is curvature of the object of treatment. For instance, a relatively high ambient air temperature is not only advantageous but essential for heating to 450°F. a rod of less than ⅛ in. diameter unless an equivalent radiant temperature of more than 720°F. is used. Since, too, the rate of heating-up of flat objects differs little whether a low air temperature and a high equivalent radiant temperature or high air temperature and medium radiant temperature are used, it is apparent that ovens intended for heating various size objects, ranging from, say, small diameter tubing or wire to flat surface objects, should be of the latter type in order to obtain uniform effectiveness.

The marked difference in the attainable temperature of various objects and the high equilibrium temperature of a vertical flat plate, especially with unidirectional radiation, makes caution necessary in using the suspended plate for testing the performance of heating equipment. As a result of the observations recorded in this Paper it is suggested that specification of the performance of ovens should include the equilibrium temperature and temperature-time curves of cylinders ⅛ in. O.D. and 2 in. O.D., and of a specified gauge and metal, suspended horizontally in the oven.

Acknowledgments

The Author is indebted to Mr. L. R. Hickson, B.Sc., A.R.I.C., Chief Chemist of Messrs. Hadfields (Merton), Ltd., for drawing his attention to the anomalous paint-drying results which initiated the investigation, and for the carrying out of the paint-drying tests.

The valuable assistance given in the experimental work by the Author's colleagues, Mr. W. S. Harmer and Mr. G. J. Long, is also acknowledged.

The experimental work was carried out in the Physical Laboratory of the South Metropolitan Gas Company, and the Author wishes to thank Mr. Dean Chandler for his interest in the work, and Dr. E. V. Evans, General Manager and Director, for granting permission to publish the Paper.

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(1) E. Griffiths and A. H. Davis, "The Transmission of Heat by Radiation and Convection," D.S.I.R. Food Investigation Board, Special Report No. 9, 1922.
(2) J. B. Carne, "Heat Loss by Natural Convection from Vertical Cylinders," *Phil. Mag.*, **24**, p. 634, Oct., 1937.
(3) R. Maxted, *Trans. Ill. Eng. Soc.*, **7**, No. 1, p. 10, 1942.

GLASGOW PUBLIC LIGHTING EXHIBITION

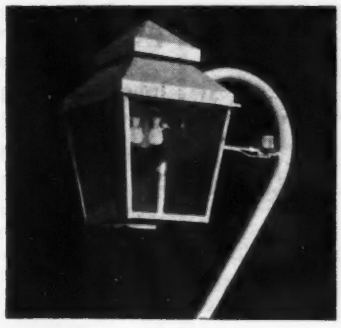
(*Concluded from p. 432*)

members, while in the upright lanterns the frog sprays are twisted to present the smallest surface to the path of light. Shadows have thereby been reduced to a minimum, thus increasing the lumen output of the lanterns. It is anticipated that the light production, equivalent to 170–180 lumens per cu.ft. (500 B.Th.U.) of gas consumed, obtained with the 12-light "Maxill" lantern tested at Watson House before the war will be attained in all and exceeded in certain of the new designs. An even spread of illumination is ensured by the inclusion of scientically designed reflectors, constructed of aluminium anodically oxidized by the "Alzak" process. An important feature of the new range of lanterns is the incorporation of standard interchangeable parts for the complete series, to reduce the cost of manufacture and the number of separate components required for spares.

Another feature is the ease with which the control devices, burners and reflectors can be removed, leaving the interior of the lantern clear for cleaning, while a novel method of glazing facilitates removal and replacement of the glass panes.

WILLIAM SUGG & CO., LTD.—This exhibit was designed to indicate those well-known and tested lamps which the Company is at present in a position to supply. The most up to date and the most prominent gas lamp on the stand was the B/2 "London" lamp. This lamp has been extensively used for modern street lighting schemes, built and constructed in accordance with the full requirements of the Ministry of Transport's Final Report on Street Lighting. It was primarily designed for Group A schemes, and has a special mirror glass optical system which can be easily and accurately adjusted to suit any change of gradient in the road. Alternative Special Reflector Systems can be supplied, these being a low cut-off system and a back reflector to give unilateral distribution. The "Rochester" Lamp has a variety of applications, and in either suspension or upright form can be employed in most street lighting schemes, including those based on the requirements of the Ministry of Transport's Final Report. The "Windsor" square lantern was shown fitted with mirror glass facetted reflectors. Its high efficiency, storm-proofness, and ease of maintenance are its main features. At the same time it is suitable for Group B lighting schemes, when the mounting height is not required to exceed 15 ft. from ground to mantles.

WILLEY & CO., LTD.—Some years ago this Company discontinued the range of street lighting equipment which it had manufactured for many years. Realizing that its re-entry into this field would render a valuable service to the Gas Industry, it was as a result of considerable experimental work showing its new "Cranford" lamp, now going into production. The lamp may be obtained with 2, 3 or 4 burner superheaters for either BS 1 or BS 2 mantles. The burner has been specially designed for this lamp, and its special features are high burner output per cu.ft. of gas consumed and stability under wide variations of gas combustion characteristics. The lantern is of all copper construction, riveted together and is supplied fitted to either a swan neck bracket for post mounting, or to a wall fixing bracket. A polished stainless steel roof reflector can be supplied as an alternative to the usual vitreous enamelled reflector.



The Cranford Lamp.

Over 211,000 visitors paid for admission to the *Daily Herald* Post-War Homes Exhibition, which closed at Dorland Hall, London, on Sept. 8. The promoters received from the British Gas Council an expression of appreciation of the manner in which the exhibition had been presented to the public and of its eagerness to co-operate in any future exhibitions of a similar type. Preliminary arrangements are being made for another exhibition in the spring of next year, featuring the latest ideas and plans of official and semi-official authorities concerned with housing and town planning.

The Ministry of Works announces that all restrictions on the use of bitumen, &c., for pipe coating are withdrawn. During the war the Inter-Departmental Committee on Building Materials Standardization issued nine economy memoranda relating to certain materials which were not freely available owing to priority service requirements. In February, 1945, it was possible, owing to improvements in the availability of the materials covered by the memoranda, to announce numerous relaxations of the restrictions imposed by wartime conditions. It was, however, necessary to continue to economize in the use of bitumen, tar, and pitch, rubber, cast iron, and hessian, which are still subject to the economy specification listed in the review of Economy Memoranda (B.M.S.C./158) published on Feb. 8.

An Interim Dividend at the rate of 3% for the year ended Dec. 31, 1945, has been declared by the Cork Gas Consumers' Company.

GAS PRODUCTS PRICES—STOCKS AND SHARES

The London Market Sept. 24.

The prices of Coal Tar Products are unchanged.

There have been two developments of interest in connexion with Coal Tar Products, the first being the cancellation of Government contracts for toluene, and the second the issue of the Control of Benzole and Allied Products Order, 1945 (S. R. & O. 1945, No. 1064), which came into force on Sept. 1 and brings all Coal Tar Spirits under one and the same Order.

As from March 5, by the Coal Tar Products Prices Order, 1945 (S. R. & O. 1945, No. 229), the maximum price of Pitch for briquetting has been increased to 60s. per ton f.o.r. supplying works, and the prices for Road Tar, as fixed by the Coal Tar Products Prices Order, 1943, S. R. & O. No. 1528, have been increased by one half-penny per gallon. There is also an increase of 5s. per ton in the price of standard Creosote/Pitch Mixture.

Coal Tar Products Prices (No. 2) Order, 1944 (S. R. & O., 1944, No. 1051), allows increases in the maximum prices for all forms of Naphthalene.

The Provinces Sept. 24.

The average prices of gas-works products during the week were : Pitch and Crude Tar,* Toluole, naked, North, 90's. 2s. 4d. to 2s. 6½d., pure, 3s. 2½d. Carbolic acid, 60's, anthracene, creosote oil (hydrogenation), coal tar oils (timber preservation, &c.), and strained anthracene oil controlled by the Coal Tar Products Prices Order, 1943, dated Oct. 20, 1943 (S. R. & O. 1943, No. 1528), operative from Nov. 15, 1943, Naphthalene controlled under S. R. & O. 1944, No. 1051, operative from Sept. 22, 1944.

Attention is called to Coal Tar Products Prices Order, 1945 (S. R. & O. 1945, No. 229), referred to on p. 305, "JOURNAL" of March 7.

* In regard to pitch and crude tar prices we would ask readers to refer to the editorial note on p. 396 of the "JOURNAL" for Sept. 10, 1941.

Scotland Sept. 22.

While deliveries are well maintained, new business is still slow. Refined tar*: Yield to Distillers is 5d. per gallon *ex* Works, naked. Creosote oil: Timber preserving quality,* 5½d. to 6½d.; hydrogenation oil,* 5½d.; low gravity or virgin oil,† 7½d. to 7½d.; benzole absorbing oil,* 6½d. to 8d. per gallon. Refined cresylic acid* is 3s. 6d. to 4s. 6d. per gallon *ex* Works, naked, according to quality. Crude naphtha†: 7d. to 8d. per gallon. Solvent naphtha*: Basic prices delivered in bulk, 90/160 grade, 2s. 10d., and 90/180 Heavy naphtha, Unrectified, 2s. 0½d.; Rectified, 2s. 4d. per gallon. Pyridine†: 90/160 grade 13s., and 90/140 grade, 15s. per gallon.

* Price controlled. † Uncontrolled.

During the early part of last week the counter-attraction of the Thanksgiving Savings Campaign somewhat overshadowed the general run of business, but at the close the tone was distinctly firmer, with slightly hardening prices, especially among home rails and some leading industrials.

Business in the Gas Market, although quiet at the opening, was particularly active at the end of the week, but it will be seen in the list below that with one exception the increased turnover had little effect on prices. The feature was a sharp rise in Oriental stock, which closed 10 points higher at 189½. Montevideo stock failed to hold its previous high level and reacted 4 points to 120½.

The following were the price movements up to the close of business last Thursday.

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Gas Consolidation "A" Ord. (*x.d.*)	22/—23/–	Sept. 17
Ditto "B" (*x.d.*)	22/3—23/3	,,
Gas Light 3½ p.c. Red. Deb. (*x.d.*) ...	98—100	,,
Montevideo Ord.	118—123	—4
Oriental	187—192	+10
South Metropolitan Ord.	86—89	—2
United Kingdom 3½ p.c. Red. Deb. (*x.d.*)	97—102	Sept. 17
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COUNTY BOROUGH OF BIRKENHEAD
(GAS DEPARTMENT)

EXTENSIONS TO PURIFYING PLANT AND HOUSING FOR TWO SETS OF PURIFIERS AT THE GAS-WORKS, HIND STREET, BIRKENHEAD

THE Corporation of Birkenhead are prepared to receive Tenders for the Supply, Delivery and Erection of PURIFYING PLANT AND HOUSING.

Drawings and Specifications may be obtained on application to the Gas Engineer, Gas Offices, Hind Street, Birkenhead, on payment of a deposit of two guineas, which will be refunded on receipt of a bona-fide Tender.

Tenders, sealed and endorsed "Tender for Purifying Plant Extensions, Gas Department," to be sent to me in a plain sealed envelope, which does not bear any name or mark indicating the sender, not later than 9 a.m. on Wednesday, October 31, 1945.

Tenders not complying with this condition will not be considered.

The Corporation do not bind themselves to accept the lowest or any Tender.

Town Hall,
Birkenhead.
September, 1945.

E. W. TAME,
Town Clerk.

(Classified Advertisements continued on p. 446)

APPOINTMENTS WANTED

REPRESENTATION

AN opportunity occurs for Manufacturers, desirably having West of England or Midland Factory, to contact Sales Engineer possessing comprehensive technical, engineering, and administrative experience and sound connexion in South-West England and South Wales, with a view to making an important appointment of representation for Domestic, Engineering, Scientific or Public Lighting Equipment. Could organize and control distribution centre if desired.

Address No. 9477, "GAS JOURNAL," 11, Bolt Court, Fleet Street, E.C. 4.

APPOINTMENTS VACANT

None of the situations advertised in these columns relates to a man between the ages of 18 and 50 inclusive or a woman between the ages of 18 and 40 inclusive, unless he or she is excepted from the provisions of the Control of Engagement Order, 1945, or the vacancy is for employment excepted from the provisions of that Order.

WEST'S Gas Improvement Company require the services of two or three JUNIOR TECHNICAL ASSISTANTS for their outside staff. Applicants should have had a sound education and training in gas and/or mechanical engineering. Experience in the erection and operation of gas-works carbonizing plant would be an advantage. Salary according to Age, Experience, and Professional Qualifications. Applications should be addressed to West's Gas Improvement Company, Ltd., Albion Ironworks, Manchester, 10.

RUGBY GAS COMPANY

APPLICATIONS are invited for the Position of JUNIOR TECHNICAL ASSISTANT at the Rugby Gas Works. Candidates should have practical experience in the operation of Gas-Works Plant, particularly W.D. Vertical Retorts.

Commencing salary £300 per annum, plus 15% war bonus.

Applications, with details of Qualifications, should reach the undersigned not later than September 29, 1945.

Gas Offices, 25, Railway Terrace, Rugby.
R. J. MEIKLEJOHN, Engineer and Manager.

COUNTY BOROUGH OF ROCHDALE

(GAS DEPARTMENT)

APPLICATIONS are invited for the Position of TEMPORARY ASSISTANT CHEMIST.

Favourable consideration will be given to applicants with Gas-Works Laboratory experience.

Salary paid will be in accordance with Grade "A" of the Professional, Technical and Administrative Division of the Corporation's grading scheme (£230, rising by annual increments of £15 to £275 per annum), plus war bonus, which is at present £59 16s.

Applications, stating Age of applicant, accompanied by *copies* of two recent Testimonials and endorsed "Assistant Chemist," should be addressed to The Engineer and Manager, Gas-Works, Dane Street, Rochdale, and must be received not later than October 6, 1945.

This advertisement has been approved by the Ministry of Labour and National Service under the Control of Engagement Order, 1945.

Town Hall, Rochdale.
HARRY BANN, Town Clerk.
Sept. 10, 1945.

THE Liverpool Gas Company requires the services of an experienced LADY DEMONSTRATOR capable of dealing with all types of public and private demonstration; knowledge of large scale cooking preferred.

Applications should be made in writing, addressed to the Personnel Superintendent, Radiant House, Bold Street, Liverpool, 1, stating in confidence full details of Age, Education, Training, and previous employers. *Copy*, not original references should be enclosed.

Sept. 12, 1945.

CHEMICAL Engineering and Wilton's Patent Furnace Co., Ltd., has vacancy for ENGINEERING SALESMAN. Knowledge of Gas Plant essential; foreign languages an advantage. Apply by letter in first instance to Chemical Engineering and Wilton's Patent Furnace Co., Ltd., Horsham, Sussex.

REQUIRED. — Gas-Works Trained First Class GAS FITTER. Knowledge of Mains and Services essential. Rate, 1s. 11½d. per hour. Applications, giving details of Training and Experience, stating position under Essential Works Order, to F. L. Harrison, Engineer and Manager, Ashbourne U.D.C., Gas Department, Ashbourne, Derbyshire.

THE Woodall-Duckham Company has vacancies for keen energetic men for training as ASSISTANT SITE ENGINEERS, on the construction of carbonizing plants in gas-works. Good opportunity for young men under 26 on demobilization leave. Permanent progressive positions to the right men willing to work away from home and with building or civil or structural engineering experience. Salary according to Age, Qualifications and Experience. Applications, with *copies* of references, should be addressed to the Woodall-Duckham Vertical Retort and Oven Construction Co. (1920) Ltd., Uplands, Epsom Road, Guildford.

COUNTY BOROUGH OF WALSALL

(GAS DEPARTMENT)

APPOINTMENT OF DRAUGHTSMAN AND ENGINEERING ASSISTANT

APPLICATIONS are invited for the above Position at a salary of £390 per annum, rising by annual increments of £15 to a maximum of £435 per annum, plus War Bonus at present being £59 16s. per annum.

Applicants must be competent draughtsmen, preferably with training or experience in the Drawing Office of a Gas Plant Contractor, and must have a good practical knowledge of the design and construction of Gas-Works Plant, Structural Engineering and Foundation Work, together with a thorough experience in the preparation of designs and specifications and with the supervision of work in progress. Some experience of Gas Distribution Systems would be an advantage.

Applicants should not be over 45 years of age.

The appointment will be terminable by one month's notice on either side, and will be subject to the provisions of the Local Government Superannuation Act, 1937. The successful candidate will be required to pass a medical examination.

Applications, stating Age, Qualifications, Experience and present position, accompanied by one recent Testimonial and names of two referees, endorsed "Draughtsman and Engineering Assistant," should reach the undersigned not later than October 13, 1945.

Candidates should state their position in relation to the Essential Works Order and National Service Acts.

Applications from persons serving in His Majesty's Forces will be considered if early release is anticipated.

Canvassing in any form is prohibited and will disqualify, and candidates must disclose whether they are related to any member of the Council.

Pleck Gas-Works, Walsall, Staffs.
(Signed) A. ALLEN, Engineer and Manager.
September 10, 1945.

PONTYPRIDD URBAN DISTRICT COUNCIL

(GAS DEPARTMENT)

APPLICATIONS are invited for the Position of DISTRICT FOREMAN at a Salary of £225 per annum, rising by annual increments of £10 to a maximum of £225 per annum, plus War Bonus, at present £59 16s. per annum.

Applicants must be fully conversant and have had sound practical knowledge of all modern lighting, cooking, heating, water-heating and industrial appliances, meter repairs, main and service laying; able to deal with estimates, complaints and general supervision of fitting work, with ability to control labour, and should not be more than 45 years of age.

Possession of Certificates in Gasfitting and supply will be an advantage.

The appointment will be subject to the Local Government Superannuation Act, 1937, and the successful applicant will be required to pass a medical examination.

Applications endorsed "District Foreman," stating Age, Qualifications, Training and Experience, accompanied by three Testimonials, must be received by the undersigned not later than first post, Monday, October 8, 1945.

Municipal Buildings, Pontypridd.
H. LEONARD PORCHER, Clerk of the Pontypridd Urban District Council.
September 19, 1945.

BRIDLINGTON GAS COMPANY

WORKS CHEMIST

APPLICATIONS are invited for the Position of WORKS CHEMIST at a Salary of £300 per annum, plus Cost of Living Bonus, which is at present £74 15s. per annum. Applicants, who should be preferably Gas-Works trained, must have good knowledge of routine tests and plant control. Applications, with full particulars of Experience and Qualifications and position in regard to the Essential Works Order, together with two *copies* of recent Testimonials, to be delivered not later than Monday, October 8 next.

Quay Road, Bridlington, East Yorks.
F. S. HUNTER, Engineer and General Manager.

GLASTONBURY AND DISTRICT GAS COMPANY, LTD.

WANTED.—WORKS FOREMAN with practical experience of Retort House Control. Apply, stating Age, Qualifications and Salary required, with references, to the undersigned, from whom full particulars may be obtained.

Offices and Showrooms, 8, High Street, Glastonbury, Somerset.
D. E. GARLICK, Manager.

CONTROL COMMISSION FOR GERMANY

FUEL, POWER AND PUBLIC UTILITIES BRANCH

A LIMITED number of qualified GAS ENGINEERS is required for service in Germany. Salaries range from £600 to £1,200, plus war bonus of £60, with allowances on going abroad of 25% for married men and 12½% for single men. There is also a foreign service allowance of £90 a year, tax free, for married men and £25 for single men, with free messing and accommodation. Applicants must be under 60 years of age and should preferably be under 55.

Write quoting C.2809A to Ministry of Labour and National Service, Appointments Department, Technical and Scientific Register, Room 670, York House, Kingsway, London, W.C. 2, for application form, which must be returned completed by October 10, 1945.

COUNTY BOROUGH OF ROTHERHAM

GAS-WORKS ENGINEER AND GENERAL MANAGER

APPLICATIONS are invited for the Position of ENGINEER AND GENERAL MANAGER of the Gas-Works Department of the Rotherham Corporation at a salary of £1,250 per annum, plus cost-of-living bonus upon the National Whitley Council Scale.

Applicants should be chartered Gas Engineers, with commercial experience and knowledge of coke oven intake.

The post will be subject to three months' notice on either side at any time, to the Council's regulations relating to sick pay and service conditions, and to the satisfactory passing of a medical examination.

Canvassing either directly or indirectly will be deemed a disqualification.

Applications, which should state the Age, Experience, Qualifications and present position of the applicant, and be accompanied by *copies* of three recent Testimonials, must reach the undersigned in a plain sealed envelope, endorsed "Gas-Works Engineer and Manager," not later than Monday, October 15, 1945.

Municipal Offices, Rotherham.
CHARLES DES FORGES, Town Clerk.
September 21, 1945.

PLANT &c. FOR SALE & WANTED

'PHONE 98 STAINES.

FOR SALE.—Weir Feed Pump, 8½ in. by 6 in. by 13 in.; Spencer Hopwood Boiler, 10 ft. by 4 ft. 3 in., 90 lb.; Sectional Steel Tank, 16 ft. by 16 ft. by 4 ft.; Steel Tank, 26 ft. by 10 ft. by 8 ft.; Weir Service Pump, 7 in. by 7½ in. by 18 in.; 30 h.p. H.S. Enclosed Steam Engine; 10 h.p. Steam Turbine.

HARRY H. GARDAM & Co., LTD., STAINES.

FOR SALE.—GAS COOLER, horizontal tube type 20 in. inlet and outlet mountings, with 20 in. rising spindle valves. 28 tubular sections, each of 18 tubes, 3 in. diameter by 7 ft. Good condition. Also sundry lengths 20 in. gas main and fittings and 20 in. Bryan Donkin rising spindle valves.

Address No. 9475, "GAS JOURNAL," 11, Bolt Court, Fleet Street, E.C. 4.

STREET LIGHTING

STEEL LAMP COLUMNS for sale. 9 to 14 feet out of ground—large quantity available. Address No. 9476, "GAS JOURNAL," 11, Bolt Court, Fleet Street, E.C. 4.

WEIGHBRIDGE.—15 ton motor Weighbridge for sale, platform 18 ft. by 8 ft. with ticket printing steelyard. Offers to No. 9473, "GAS JOURNAL," 11, Bolt Court, Fleet Street, E.C. 4.

FOR SALE.—Five 12 lt. No. 2, size Sugg's "London" PUBLIC LAMPS, "C" Pattern, complete with mantles, governors, and with connexions for controllers, which are not included.

One Lamp as above, but damaged and useful for spare parts.

£80 the lot *ex* Stores.

Apply Tunbridge Wells Gas Company, 44, High Street, Tunbridge Wells.

Get in on the Under Belly of RUST (Engineers' Enemy No. 1.)
Years of Wear instead of Weeks
GRANT & WEST, LTD
'PHONE NORTH 2160
Steel Wires, Ropes & Cables running in and out of Water, Gas, Sulphurous Fumes, etc. will never RUST if treated with
ROPRES
IT KILLS RUST
STAYS on every STRAND.
RUST KILLS ROPES, — but ROPRES rope preservative KILLS RUST. Use ROPRES
Try a Tin on our Guarantee
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'GRAMS "SELEKJOINA, HOLWAY, LONDON"

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INDUSTRIAL DERMATITIS

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protects against
PAINT, GREASE, SPIRITS OIL, Etc.

Supplied in 12 × 2 lb. tins and 6 × 7 lb. tins.
Also 28 lb. and 1 cwt. kegs.

For abnormal conditions special grades can be supplied.

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protects against
WATER-WET SOLUTIONS (SOLUBLE OILS), CHEMICALS, Etc.

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LIGHT RAILWAY TRACK, POINTS AND CROSSINGS

Completely fabricated on steel sleepers ready for laying down. Right-hand, left-hand, symmetrical and three-way. Portable Turntables of all types. Tip Waggons, Colliery Tubs, Brick Cars and special waggons of every description.

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SAFETY AND PROTECTIVE APPLIANCES OF ALL DESCRIPTIONS.

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India-Rubber and Airproof Manufacturers and General Contractors.
LARGEST MANUFACTURERS OF GAS MAIN BAGS.
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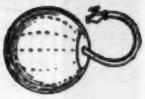
Gas Bags for Repairing Mains.

Contractors to H.M. Government.

PATENTEES OF THE
DENMAR BAG
Impervious to Main Liquor and Climatic Influences.



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Pull-through and Expanding MAIN STOPPERS.
All types of INDIA-RUBBER BOOTS.
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Stokers' Mitts and Gloves of every description

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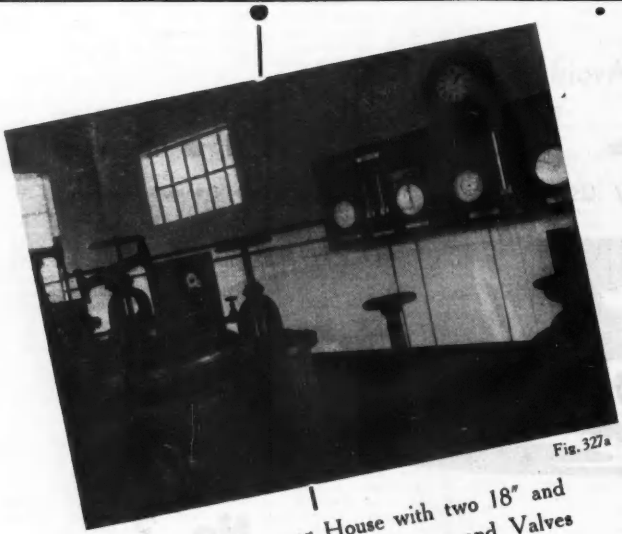


Fig. 327a

Station Governor House with two 18" and two 24" Diaphragm Governors and Valves under Peebles Patent Clock Loading; also handsome Pressure Gauge and Clock Panel.

Governors that look after themselves by Clock-Loading

In this Governor House personal attendance on governors is reduced to a minimum. Little more is needed than to re-wind the clocks once a week. Automatically the loading is changed at prearranged periods, day and night.

Even Sunday's special load is taken care of. Gas Works using Peebles Clock-Loaded Governors report a big saving in wages since installing these governors. The Works can be operated more efficiently than before with a smaller staff.

Peebles

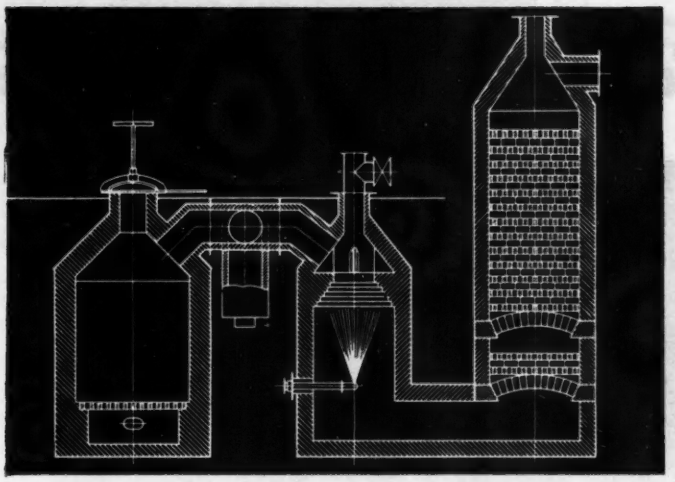
CLOCK-LOADED GOVERNORS

Ask for data of this labour-saving equipment

PEEBLES & CO. LTD., TAY WORKS, BONNINGTON, EDINBURGH
Telephone: LEITH 36544 Telegrams: Tangent, Edinburgh
E.I.H.

IGNITION DOME CARBURETTED WATER GAS PLANT

(As developed by the Semet-Solvay Engineering Corporation)



IGNITION DOME CHEQUERLESS CARBURETTER for effective combustion and freedom from blockage.

OPPOSED OIL INJECTION for efficient oil cracking.

SUPERHEATER with independent support of lower section chequers to facilitate cleaning and maintenance replacements.

CONE TOPPED VESSELS for stability, accessibility and cleanliness.

AUTOMATIC OPERATION for LABOUR ECONOMY & PROCESS EFFICIENCY

BLUE & CARBURETTED WATER GAS PLANT

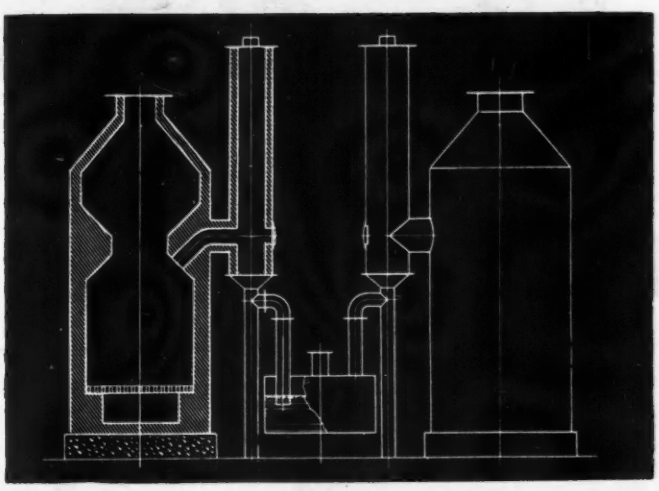
MECHANICAL ASH EXTRACTION, AUTOMATIC COKE FEED, AUTOMATIC OPERATION

ANY SIZE UP TO UNIT CAPACITIES OF 10,000,000 CUBIC FEET/DAY

PGC

TWIN GENERATOR BLUE WATER GAS PLANT

★ IDEAL FOR DILUTION PURPOSES
★ NO RELIEF GASHOLDER REQUIRED
★ CONSTANT GAS FLOW
★ CONSTANT FUEL DEPTH
★ AUTOMATIC OPERATION
★ MINIMUM LABOUR
★ NO SPECIAL PLANT ATTENDANT
★ INCREASED THERMAL YIELD PER TON COAL CARBONISED



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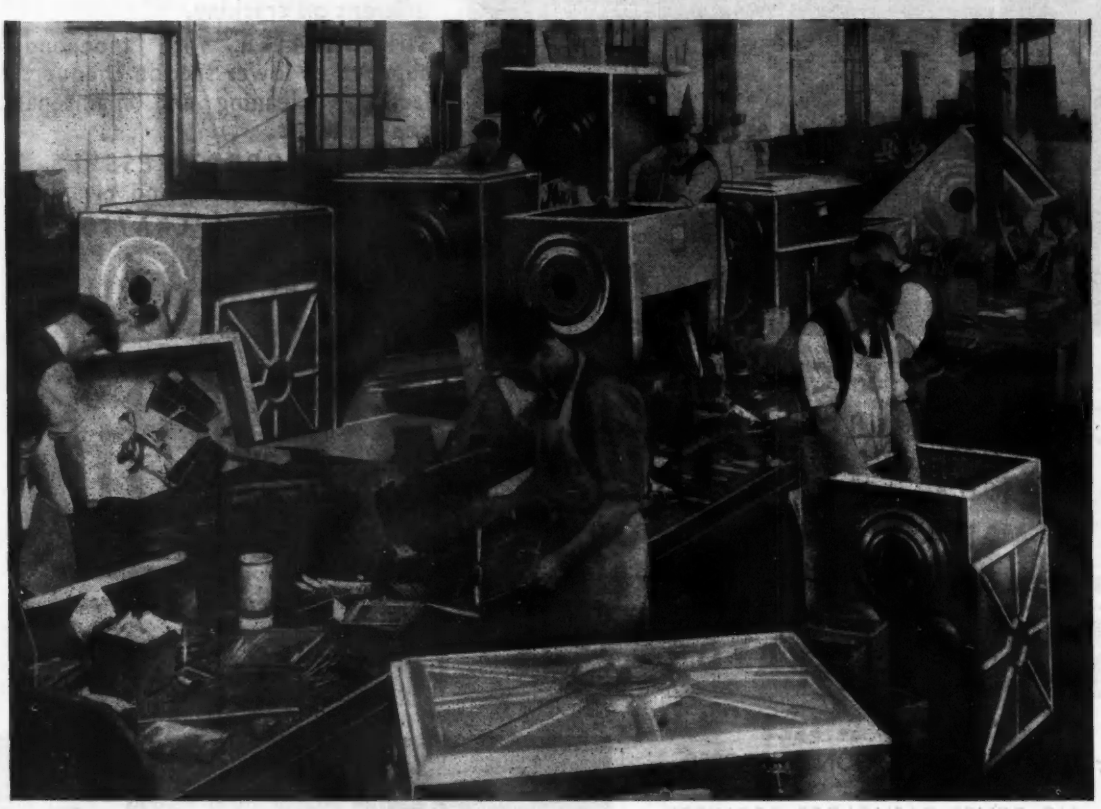

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Any Capacity Required

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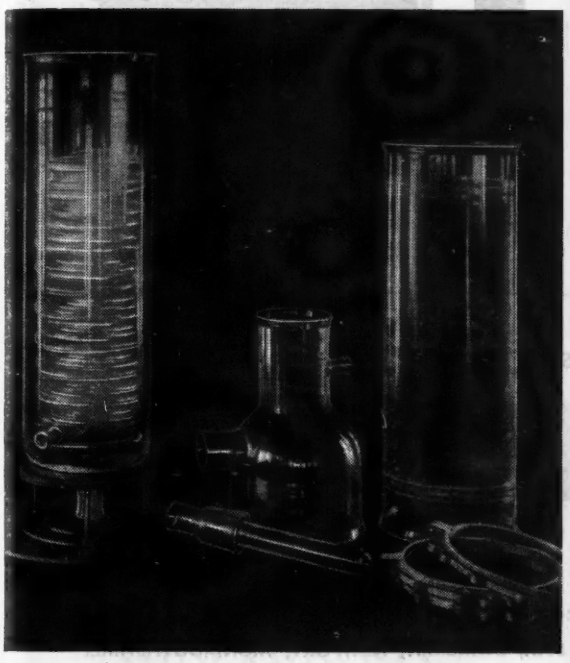

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The total height of the Bleaching Tower when assembled was 30 feet. The tower contained, in all, 550 feet of spiral tubing, 187 of which are contained in the boiling unit shown above.

We are frequently asked to build up Assemblies such as this, and shall be pleased to co-operate with research workers and manufacturers at any time, either working from drawings supplied or preparing these ourselves from instructions received.

Ask for PYREX Brand and see that you get it!

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Inlet Pressures, 1–75 lb. per sq. in.
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The King Electric Chain Pulley Blocks are built for continuous heavy duty. Three models available—Minor, Major, and Mammoth—ranging in capacity from 5 cwt. and 10 tons.

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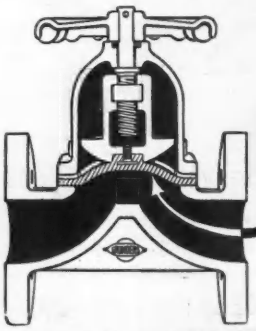
IT STANDS TO REASON—No. 3



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Positively confined to the pipe-line, the fluid can neither eat its way past the seat nor seep through spindle packings to atmosphere. For other advantages see complete illustrated technical data, free on mentioning this publication.

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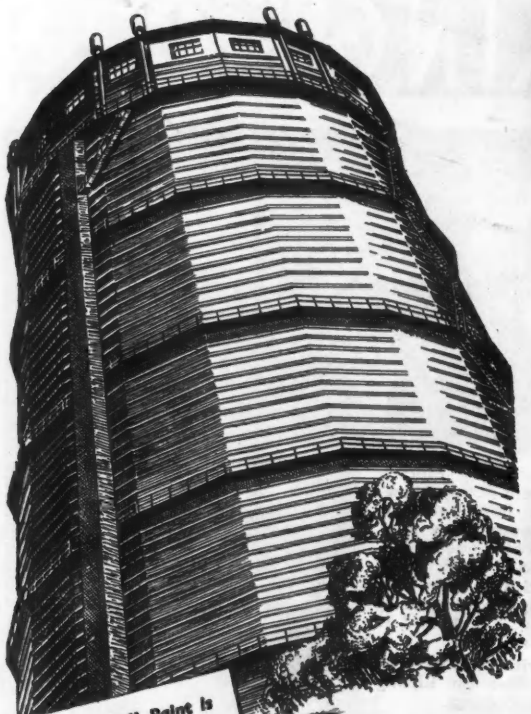

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Since 1939 large numbers of our men and women have been serving their country in the Forces.

Soon many of them will be returning to their homes, anxious to make a place for themselves in the life of a nation pursuing the arts of peace.

Constructive help will be needed in solving the many business problems that will confront them after long absence from the ordinary affairs of daily life.

The managers of the branches of the Midland Bank have a wealth of experience and knowledge in such matters which they will gladly place at the disposal of men and women—whether customers of the Bank or not—upon their return to civilian life.

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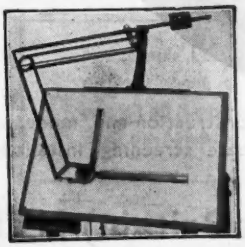

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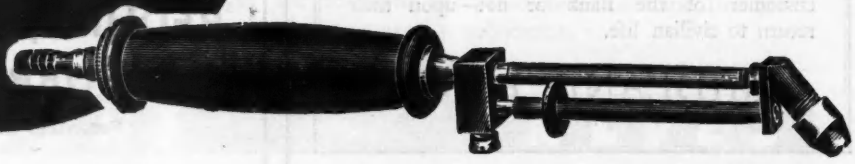
KEITH BLACKMAN GAS BLOWPIPES

THESE Blowpipes are intended for use with High-pressure Gas, and are very useful plant equipment, having, amongst other advantages, greater freedom in use because only one flexible connection is necessary —a gas connection.

Made in six sizes, for gas consumptions from 6 to 400 cubic feet per hour.



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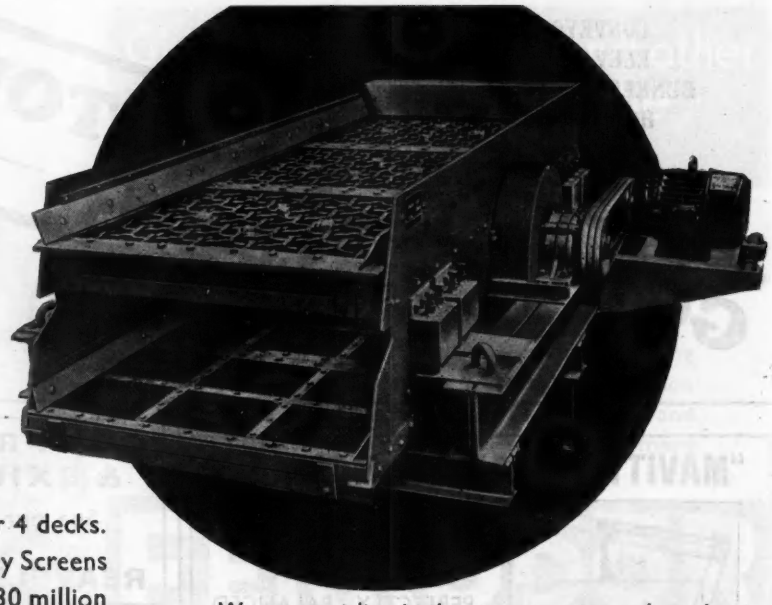
Niagara Vibratory Screens

give maximum grading efficiency, from run-of-mine to slack, by their high speed, positive and very lively vibratory action. The screens are precisely balanced, mechanically operated, and are supplied as self-contained and totally enclosed units, with 1, 2, 3 or 4 decks. The capacity of "Niagara" Vibratory Screens for the coal industry alone exceeds 30 million tons per annum.



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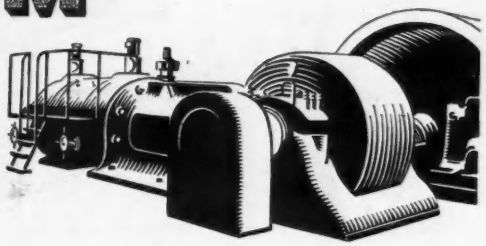
POWER FROM STEAM



How to make a servant of your power-producing medium

A good captain knows the idiosyncrasies of his team; a good workman knows his tools—a bad one blames them. You cannot expect to get the best out of your steam unless you know what its properties and capabilities are.

You may think that you know all that is necessary for the operation of your power plant, but unless you understand the Steam Tables thoroughly you cannot be sure. Do you know whether your steam engine is operating efficiently, what its steam consumption should be, what it actually is? Do you know *all* the possibilities of using the exhaust for process purposes?

These Bulletins will help you

STEAM FOR PROCESS HEATING
(*Bulletin No.* 25)

A simple introduction to the properties of steam leading to a more critical understanding of the steam tables.

COMBINED POWER AND HEATING
(*Bulletin No.* 40)

A complete survey of the possibilities of using the exhaust steam from an engine for process purposes, or for developing power from the steam before it reaches the process. This bulletin is written in a form suitable not only for the engineer and the specialist but also for the management.

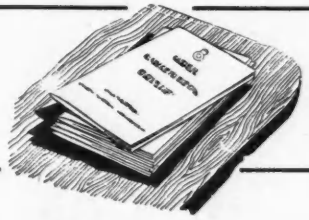
STEAM FOR POWER (*Bulletin No.* 33)

An explanation of the power-producing properties of Steam. Read No. 25 first and then this bulletin, which, among other things, explains "entropy" without advanced mathematics.

THE EFFICIENT OPERATION OF STEAM ENGINES
(*Bulletin No.* 34)

The practical side of steam engine operation: how to get the most power from the least steam. What the indicator diagram is and what it means.

Few people know how interesting steam can be until they have had to learn about it. These bulletins make the learning easy. If you haven't all the copies you require, they can be obtained free on demand from the Ministry's Regional Offices.



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VULCAN STOVES

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